MODEL AIRPLANE NEWS

JUNE 1954 — 35 CENTS

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MODEL AIRPLANE NEWS

25th Year of Publication

JUNE 1954 Vol. L—No. 6

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M. A. N. AT WORK

by William Winter

▶ At its annual dinner and meeting at the Toy Fair in New York, the model airplane section of the Model Industry Assn. came up with a promotional idea that could vitally affect the hobby as we have known it. The manufacturers, for the second time in their history as an organized group, decided to promote the building of model aircraft in the schools.

In times of recession, and we use that word very loosely indeed, manufacturers naturally look to expand the market and what bigger market could there be than millions of school kids? Toward the end of the last war (the big one), the MIA financed the Institute of Air Age Activities, members subscribing a large sum of money for this and other such worthy and allied works as having evaluated by the Texas A & M College the quality and suitability of kits which, perforce, had suffered through wartime shortages and which, faced with reappearance of competitive civilian postwar items, had resulted in a postwar readjustment in the business.

The MIA had then dropped activity in that field. But the plan resulting from the Texas study apparently could be polished up for application in the mid-1950's. Underwriting of such a program would be largely dependent upon co-operation of the full scale manufacturers who, unfortunately, seldom render more than lip service to "air youth." To prime this promotional engine, smaller funds are to be subscribed by MIA aeronautical members to engage the services of a professional fund raiser who would seek airplane industry cooperation and support.

An interesting side point, which went uncontested, was that the plastics plane producers have sliced themselves a purty big piece of the consumer pie and that modelers allegedly do not learn building skills and don't really participate in their hobby unless they "make" a model. We'd hate to have to prove this concept for it is far more *(Continued on page 6)*

PLANE ON THE COVER

Like some huge jet fighter, Great Britain's Handley Page Victor, a crescent-winged, four-jet bomber, whistles across artist Jo Kotula's imaginative cover painting. The Victor is one of Britain's "big three" atomic bombers. It is distinguished by the multiple sweepback angle which diminishes near the wing tips. According to the scale on a recent drawing, its great bomb bay doors are longer than a good sized house. Four Armstrong Siddeley Sapphire turbojets, each of 8,000 pounds' thrust, push the big bomber at high speeds. Britain favors the "buried" engines.

NEXT MONTH'S COVER

Pretty girl, plus pretty airplane, adds up to a pretty picture and a perfect cover for the beginning of summer. For this light interruption in the series of warplane covers, thank Ralph Strutz, photographer, and Miss Mary Ann Kaufman, 21, of Menominee, Mich. The radio job on floats is an experimental job by Joy Products Company of that city. ROW radio is a coming field.

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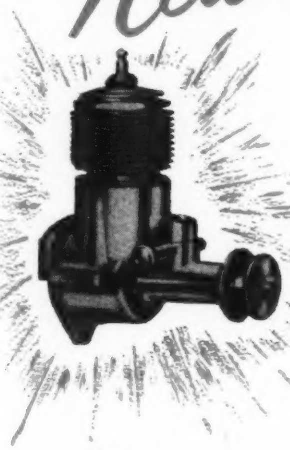

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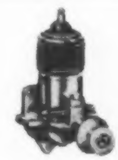

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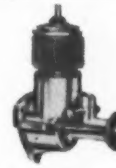

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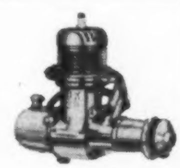

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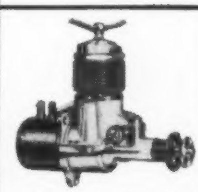

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CUB .049x	$5.75
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HERKIMER TOOL & MODEL WORKS

88 Harter St. Herkimer, N. Y.

MAN at Work

(*Continued from page* 2)

likely that plastic planes are being sold to hundreds of thousands—rather, millions—of people who might not otherwise be building models. The plastics people say, of course, that new modelers looking for more ambitious subjects are being created in droves. Anyway, aren't plastics models the ultimate end of the trend to prefabrication? While demanding prefabricated products, how can we decry 100 per cent prefabrication?

Although modeling in the schools is a high and worthy objective, when quickly considered, there are, nevertheless, other considerations. For example, at the 1953 meeting, Jack Besser, the sharp-as-a-tack head of Monogram, had set forth the eight goals the Section should study, such as flying sites, Wakefield team expenses, the AMA support, publicity, schools, and so on. In the 1953 reports, Russ Nichols, AMA Director, stated that $600 additional funds were needed each month in order for the AMA to mail *Model Aviation* to all its members; the Wakefield expense report related that the modelers had gone through another year of financing themselves by means of a booklet in which some industry good-will advertising had been placed (that booklet was a bust in the hobby shops, unfortunately). Support for the AMA, Internationals teams, etc., has a more indirect and hence less obvious promotional value to the industry, whereas the picture of millions of kids putting together built-up models is a heady thought, indeed.

It seems to us that modeling in the schools is a question of voluntary versus compulsory modeling. Before the last war, much noise was made about the national modeling program in enemy countries, such as Germany, and it was generally felt—and by this writer, who now benefits from hindsight—that Americans should apply the same goose-stepping technique. Because American kids loved to build model airplanes, derived fun and lasting pleasure, found careers and new skills from the hobby, this nation built the greatest air modeling movement the world has seen. And it is still just as much fun as ever. Perhaps we would be wise to leave it that way?

For a decade at least, there has been a tremendous emphasis (but not in the model business) on how-to-do-its. Publishers of all kinds of books are riding a new twist—do it yourself—and the country is eating it up. Ten-year-old kids have written this magazine of late, showing a broad interest that we all have ceased to credit to the American boy. Boys, far more than adults, like to "do-it-yourself." But can't you hear the jobber saying, "Holy cow, how do you expect me to sell this?" Probably he's right. What a sad commentary.

• • •

▸ Hal Roth's "Should We Scrap Microfilm" in the April issue shoved the indoor question into the national spotlight. Said Parnell Schoenky, helicopter expert from Kirkwood, Mo. "I'm glad that somebody finally had the initiative to give indoor some thought and elbow grease. As to how to improve it, I go 100 per cent for the idea of ditching the cabin event and substituting the paper-covered stick event, with Roth's curves for prorating performance to be applied.

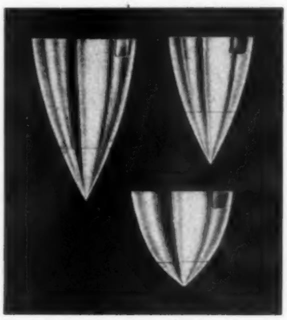
"Splicing in the paper-covered event has a two-fold advantage," Schoenky goes on. "It encourages thousands to join the fun of indoor flying the year 'round and it gives many modelers with that latent interest in indoor a vital start. Roth's efforts are a fine start toward revitalizing a fascinating sport. Let's temper our enthusiasm with reason, put this new event on the books in place of touchy cabin, and see if two years of paper *and* mike don't work out well for all concerned."

(*Continued on page* 42)

TRADE SHOW

MONTHLY REVIEW OF NEW PRODUCTS, OTHER INTERESTING ITEMS WORTH ATTENTION

▸ *Piasecki Helicopter:* Made history in Korea and authentically detailed in polystyrene plastic by Helicopters for Industry, 111 Cathedral Ave., Hempstead, N. Y. Available in Navy blue, Marine blue, Air Rescue Service gray, and Air Force silver. The kit includes the display stand, priced at $2.98.



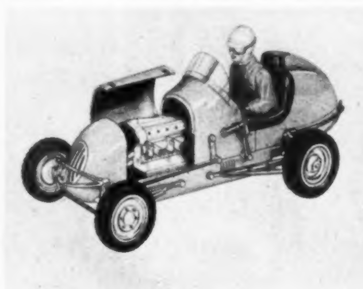
▸ *Froom Spinners:* For both Half-A and A engines. Hand spun for maximum strength and light weight, balanced against vibration. Diameters: 1-1/4, 75¢; 1-1/2, 80¢; 1-1/2, 90¢ (different style). Will clean up looks. Made by Froom Manufacturing Co., 718 East Colorado Blvd., Glendale, Calif.

▸ *What's the rpm?:* Vibra-Tak, $5, Verdell Instrument Sales Co., Box 212, Burbank, Calif., reads from 2,000 to 15,000. Pencil sized slide rule type, fits in leather carrying case. Aluminum tuning slide varies length sliding reed. Marked for easy reading. Check fuels, plugs. Reading at greatest swing.

▸ *Little Buckeye Speedboat:* New version of popular boat series, this 12-in. job takes any of small bore Half-A's, electric motors, or Jetex. Completely prefabricated, all parts

cut, formed, shaped. Brass fittings, detailed picture plan. Accessible mounting of engine makes flywheel starting of inboard engine just as easy. Scientific Model Airplane Co., 113 Monroe St., Newark, N. J. $1.95.

▸ *All Plastic Midget Racer:* All parts molded to shape in acetate plastic. Parts snap fit and press together for quick, easy assembly. Features all details, including removable,

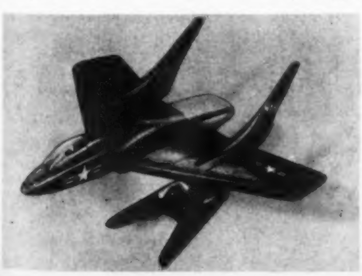


hood, "Offie" engine, instrument panel, pump, brake lever, driver. Prototype is an actual Chicago owned racer. Parts in this kit do not require special cements. Kit 98¢, Monogram Models, Inc., Chicago 32, Ill.

▸ *Sterling U-Control Corsair:* One of the greatest fighting planes of all time, kitted for B and C Class engines. Completely prefabricated, engineered especially for navy

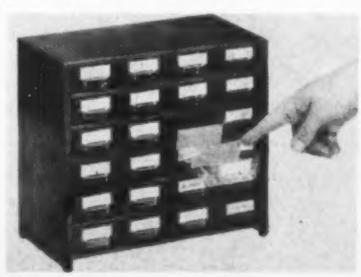
sponsored carrier event flying. Plywood and balsa parts are die-cut or shaped. Kit includes custom aluminum cowl and formed canopy. Wing span is 36 in. Price, $5.95. Made by Sterling Models, Philadelphia, Pa.

▸ *Cutlass in Plastic:* Recently added to Revell's (Revell, Inc., Venice, Calif.) Air Wing series at 59¢, is Navy Cutlass jet fighter. "Flight-in-motion" stand included. Kits include pilot, clear canopy, needle nose, full-color insignia decals. Available with Cougar, Starfire in three-in-one package.

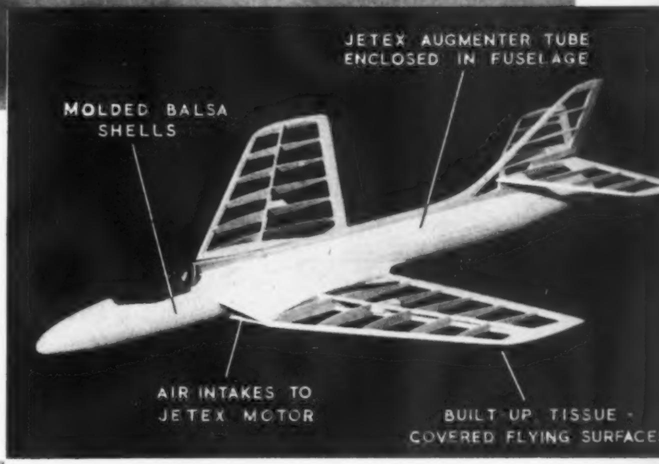


▸ *Bird Dog:* Flying scale model for rubber power is Cessna L-1 Bird Dog, 18 in. job by Paul K. Guillow, New Salem St., Wakefield, Mass. One of three (DeHavilland Chipmunk, North American T-28 Trainer), it retails at 50¢. Die-cut balsa, one-piece side frame construction, plastic canopy, so on.

▸ *Jiffy Cabinet:* A 16-drawer cabinet for small parts, ideal for model workbench, boon to RC modeler. Red with clear plastic drawers. Metal frame. Can be hung on wall. With 24 drawers, price $9.95; 16, $7.95; 32, $13.95. Made by Fidelity Products, Dept. 8N, 2817 Third St., N.W., Canton, Ohio.



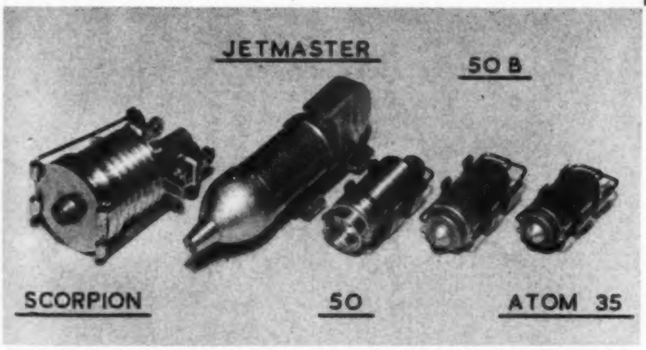
Until you miss the pilot, this Jetmaster-powered Hunter passes for real thing. Built by 1936 Wakefield winner Bert Judge, England. Right—Fully enclosed jet motor and thrust augmenter tube realistically hidden in sheet molded body.



Ingenious rocket motors have been steadily improved. Ideal "jet" power for free flight, flying scale.

All about JETEX

By P. G. F. CHINN



Latest improved units feature easier loading, better power/weight ratios. Scorpion develops five-six ounces of thrust for the two-ounce weight of engine.

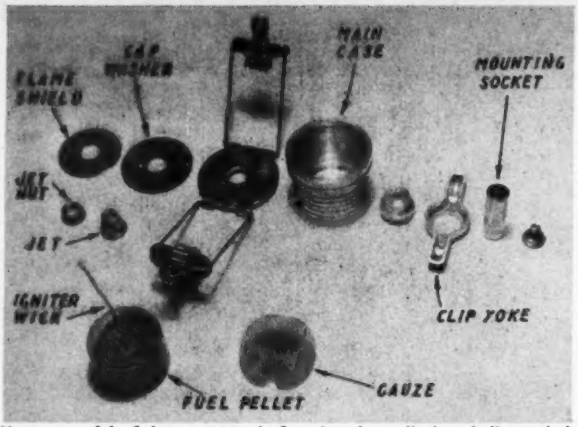
Another good example of modern jet-powered flying scale models is this Supermarine British jet fighter. Air intakes are functional; load, bottom hatch.

Jetex has been with us now for six years. The only surprising point about this is that it still has no competitors, the makers, Wilmot Mansour & Co., Ltd., of Southampton, England, having a virtual monopoly of the rocket motor field. Despite this monopoly, however, many improvements have been made to Jetex motors since their introduction: to the fuel used and to methods of reloading in particular.

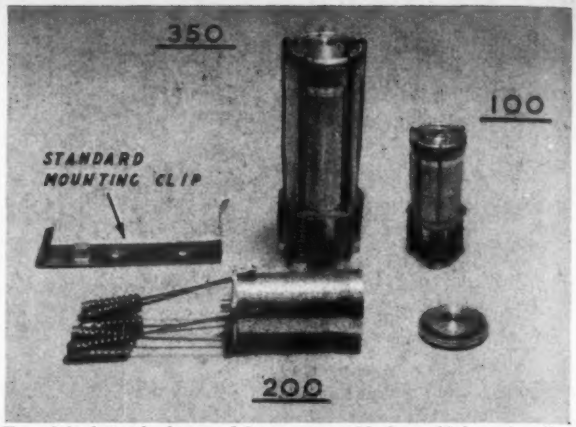
Before Jetex arrived, reaction-propulsion models were possible only when powered by big, powerful pulsejet motors like the Dynajet, or, at the other extreme, by CO_2 capsules. The former are, of course, only suitable for fast or relatively large and heavy controlline models, while the latter comprised a limited system of propulsion.

Jetex fills this big gap by providing a suitable means of powering various types of popular size free flight models, including true-scale models of jet aircraft.

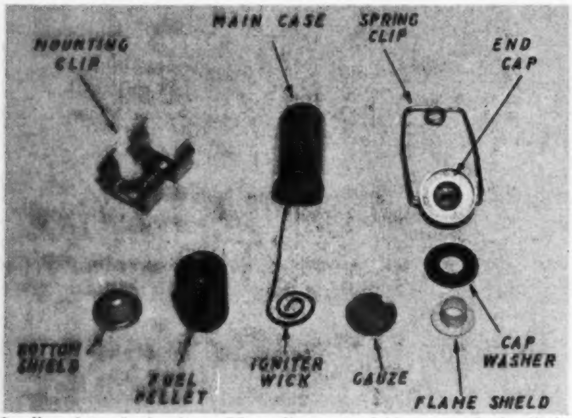
The Jetex idea was conceived by Charles Wilmot and Joe Mansour following their work on rocket-propelled target models for the armed services during World War II. Both men have been connected with the model industry for more than 20 years and initiated the well known "Frog" models produced by the International Model Aircraft division of the immense Lines Brothers organization. More recently, Albert A. Judge, who, in



Most powerful of Jetex motors is Scorpion, here displayed dismantled.



The original standard type of Jetex motor with the multiple spring clips.



Smallest Jetex is the Atom 35, scaling scant 1/4 oz., ready for flight.

Augmenter tubes allow enclosed installation, scale intakes, tail pipes.

1936, won the Wakefield when it was held at Wayne County Airport, Detroit, and who has been concerned with the development of kits and engines ever since, joined the Jetex company to become chief of the experimental department.

Deceptively slow in catching on during the first year or two of production, Jetex is now used by far more model builders than contests and other publicized activities would appear to indicate. Jetex has very little contest representation. Free flight duration contests for Jetex models are featured at some of the bigger British meets and at the Australian Nationals and there is an annual international contest, sponsored by Jetex, for the Imperial Chemical Industries Trophy. In general, however, we would say that the popularity of Jetex has thus far depended on its appeal to the non-contest-minded modeler, the strictly fly-for-fun enthusiast, who goes for Jetex because it offers something new, is cheaper to buy (in most countries) than a normal piston motor, or because it is readily applicable to aircraft designs of a type otherwise difficult to duplicate, such as modern swept-wing fighter planes.

Since Jetex provides a solution to propulsion problems which often cannot be answered with any other type of power unit, it is, perhaps, irrelevant to compare it, adversely or otherwise, with other popular types of motors. However, let us be quite fair and examine the disadvantages, as well as the advantages, of Jetex.

As far as performance is concerned, the Jetex unit, generally, falls a little short of a good glow plug or Diesel motor on a power-to-weight basis, although the Scorpion contest motor, with a static thrust of 5-6 oz. for a loaded weight of 2 oz., does not compare unfavorably with a Half-A piston motor and propeller of similar weight. The Jetex would, of course, show up better at higher air speeds and some quite high speeds have, in fact, been reached with tiny indoor tethered models powered by the smaller units.

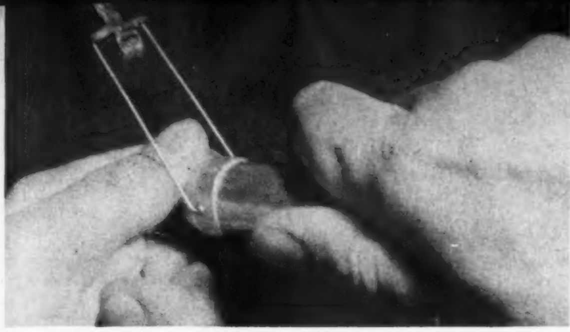
As regards cost, the imported Jetex is cheaper to buy in the smaller sizes than most small glow plug motors, but the subsequent running costs, in terms of fuel, etc., are a little higher. Jetex motors need more frequent maintenance than glow or Diesel engines but, against this, can be set the fact that, given such attention, they will last almost indefinitely, while the risk of damage in a crack-up is practically eliminated and the expense of prop replacement entirely ruled out.

In the Jetex motor's favor is the fact that it calls for no special skill or knack in starting. It is somewhat more tedious to refuel than a piston engine, especially as the motor casing gets hot and it is therefore necessary to let it cool down before handling, but it is safe in operation and generally cleaner than a Diesel or glow plug motor.

Since the introduction of the original Jetex 100, 200 and 350 models in 1948, a number of other units have been added to the range. In order, these comprise the 50, 150 Jetmaster, 50B, Atom 35, and Scorpion 600 models.

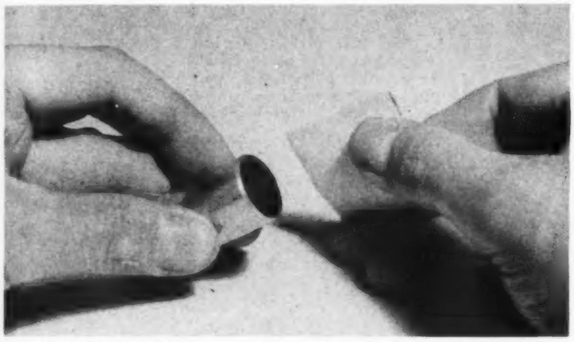
Basically, a Jetex motor is very simple. It consists of a cylindrical aluminum alloy case or body into which the fuel, which is in the form of a solid, cylindrical shaped pellet, is loaded. A length of fuse, or igniter-wick, as the manufacturers term it, is coiled down on the face of the pellet and is held in close contact by a small disc of wire gauze. The gauze has a small slot cut in one side, enabling the free end of the wick to be led through the jet orifice for igniting. (There is a recent modification of this, however, which we shall describe in a moment.

Every Jetex motor has a spring-loaded end-cap with a jet

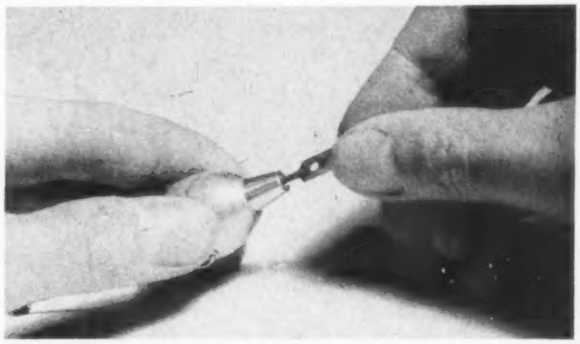


To avoid damage, keep a good gas seal, rotate end cap when removing it.

End cap edges must be kept clean. Renew washers when found necessary.



On units with pressed cases, edges are kept clean with fine sandpaper.



Clean jet of utmost importance. Special reamer here used on Jetmaster.

hole in the center. Gas generated by the combustion of the charge accumulates in the free space behind the pellet and is emitted at great pressure through this jet, thus providing the propulsive thrust. In the unlikely event of the jet becoming choked, the spring tensioned end-cap will lift, acting as a relief valve. Without this precautionary design feature, gas unable to escape would build up a pressure which would burst the casing.

The first production Jetex motors had multiple coil springs to retain the end-cap, which proved rather tiresome to the more impatient members of our hobby as the springs had to be released individually, by means of a special tool, every time the motor was reloaded.

Because of their much smaller size, however, the 50 and 35 could safely use a single U-shaped (*Continued on page* 45)

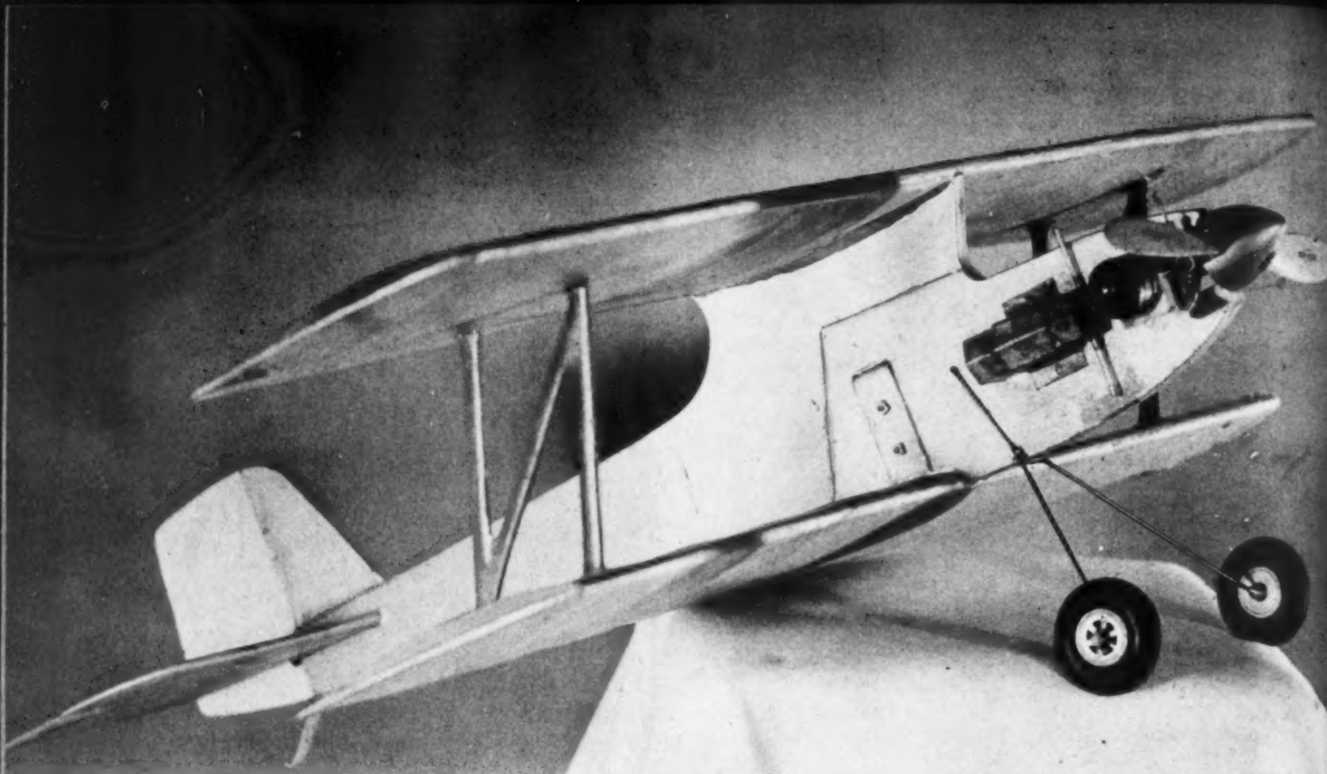
Clean case with wood scraper. Dismantle and wash to avoid corrosion.

MAKE	NOMINAL THRUST OZ.	DURATION OF THRUST SECS.	WEIGHT EMPTY OZ.	WEIGHT LOADED OZ.	OVERALL LENGTH (MOTOR ONLY) IN.	MAX. DIA. OR WIDTH (MOTOR ONLY) IN.	TYPE OF MOUNTING	REMARKS
SCORPION 600	5.5	8 - 10	1.6	2.0	2.25	1.7	SPIGOT	LATEST & MOST POWERFUL JETEX MOTOR.
350	4.0	12 - 36*	2.5	3.0 - 3.8*	3.75	1.4	CLIP OR SINGLE SCREW	ORIGINAL STANDARD TYPE UNITS, MACHINED CASES & MULTIPLE SPRING-CLIPS.
200	2.5	12 - 24**	1.2	1.5 - 1.9**	2.85	1.2	CLIP OR SINGLE SCREW	
100	1.0	15	0.65	0.9	2.25	1.0	CLIP OR SINGLE SCREW	
JETMASTER 150	1.75	12	0.75	1.0	3.5	1.05	CLIP	THRUST MAY BE INCREASED TO 2.25 OZ. WITH AUGMENTER-TUBE.
50	0.5 - 0.6	12 - 15	0.25	0.36	1.75	0.8	CLIP	TURNED CASE. NOW BEING REPLACED BY 50B TYPE.
50 B	0.5 - 0.6	12 - 15	0.22	0.33	1.85	0.8	CLIP	IMPROVED VERSION OF EXPORT 50 AS IMPORTED INTO U.S.
ATOM 35	0.4 - 0.5	7	0.16	0.25	1.7	0.75	CLIP	SMALLEST JETEX. SUITABLE FOR 10 - 12 IN. MODELS.

GENERAL DATA - JETEX MOTORS

* 350 MOTORS USE 1, 2 OR 3 FUEL PELLETS.

** 200 MOTORS USE 1 OR 2 FUEL PELLETS.



When MAN asked author (of Texas Winters) for plans, original job was tuckered out; pix show slightly modified sistership. Either way is ok!

Smartie...

By WILLIAM F. WINTERS

Trainer and stunt job performance are combined in this profile biplane. Proved design, good for .29's to .35's, and quite docile on 52 ft. lines.

▶ This model is the result of several experiments in biplane design. Working on the theory that a biplane would make a good stunt ship, Smartie is the final result.

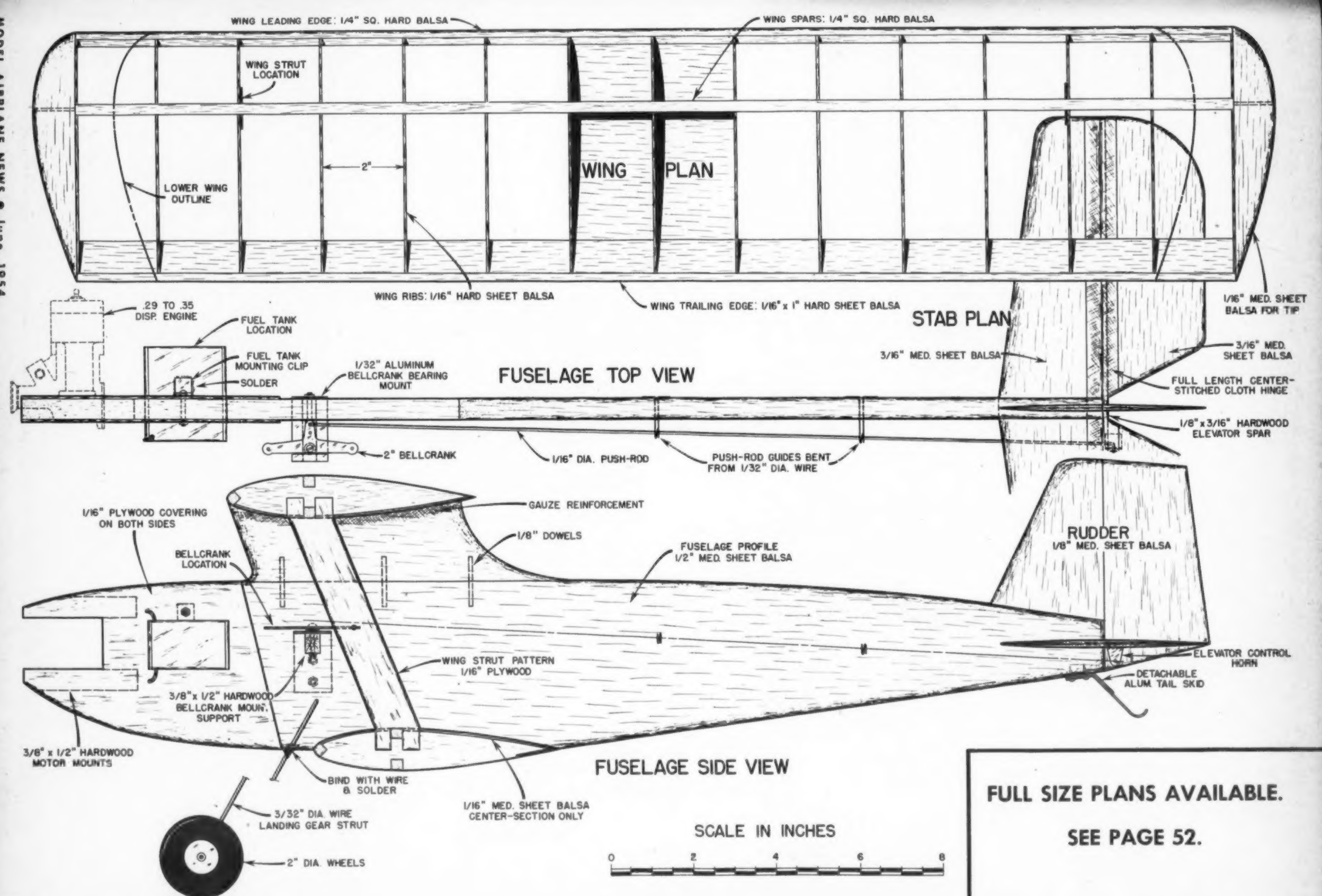
The fuselage was built first. Simply cut from straight grained 1/2 in. balsa to correct shape and add top part for upper wing mounting. Cut to shape shown on plans. Cut out for wing section both top and bottom.

The wings are self-explanatory. To save weight the trailing edge was made from 1 x 1/16 in. balsa and inserted in cut-out on bottom edge only. Plank mid-section of top wing on bottom only; bottom wing, top only, to fit to fuselage.

The bellcrank fixing was made from scrap aluminum, inserted through slot in fuselage and a small piece of engine mount material inserted in cut-out just below aluminum through fuselage. See plans.

The engine (a Fox .35 was (*Continued on page* 53)

Ply facing of profile fuselage, sturdy bellcrank mounting, control system show clearly here. Smartie holds very well on overhead maneuvers.



FULL SIZE PLANS AVAILABLE.

SEE PAGE 52.

Betty Slade, Radar Communications Technician in the RCAF, in Manitoba, finds relaxation making model aircraft, like this U. S. Navy Panther jet.

Saucer man, Denny Severance, Bell, Calif., has 'em in all sizes, shapes. Five-pound U-control job, front; cardboard job, left; right, gyro disc.

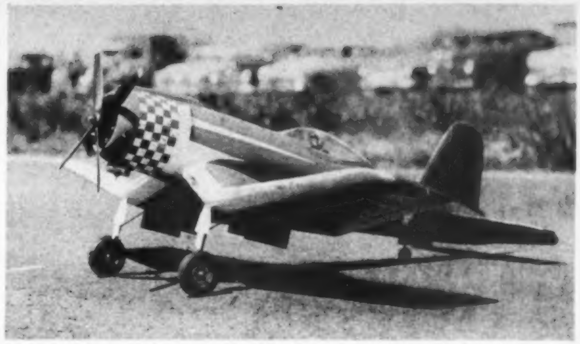
P-47, Vincent Morgan, Kurseong, India, has 1,600 parts, including all movable engine parts. Nothing—repeat, nothing—has been left out. Whew!

On the Island of Malta, George Curmi gets in his flying with such ships as this Frog Firefly, 36 in. biplane powered by a 1 cc. British Diesel.

Of all the Gee Bee's made from MAN plans (Oct. '51), this one takes the cake. Rolf Norstog, Wichita, Kan., added stringers, wires, rivets, etc.

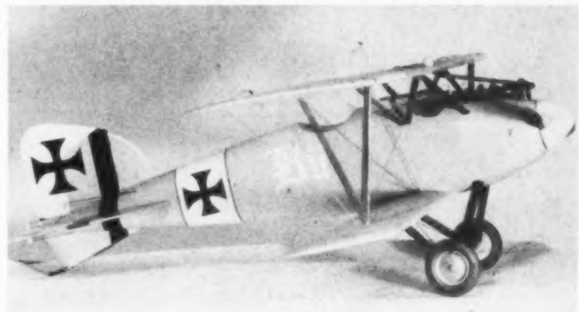
AIR WAYS

Shades of a United Nations roll call!

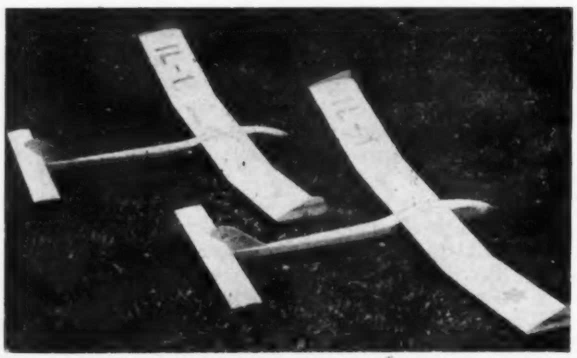


Don Santee would like you all to drool over Jim Linke's (Seattle) wonderful Corsair. Veco .29 powered, it won first at the big Northwest meet.

Only modeler in Carcar, Cebu, Philippines, is Albert Valencia, who, nonetheless, does sharp job on RC, U-control, as this DC-3 twin Ohlsson.



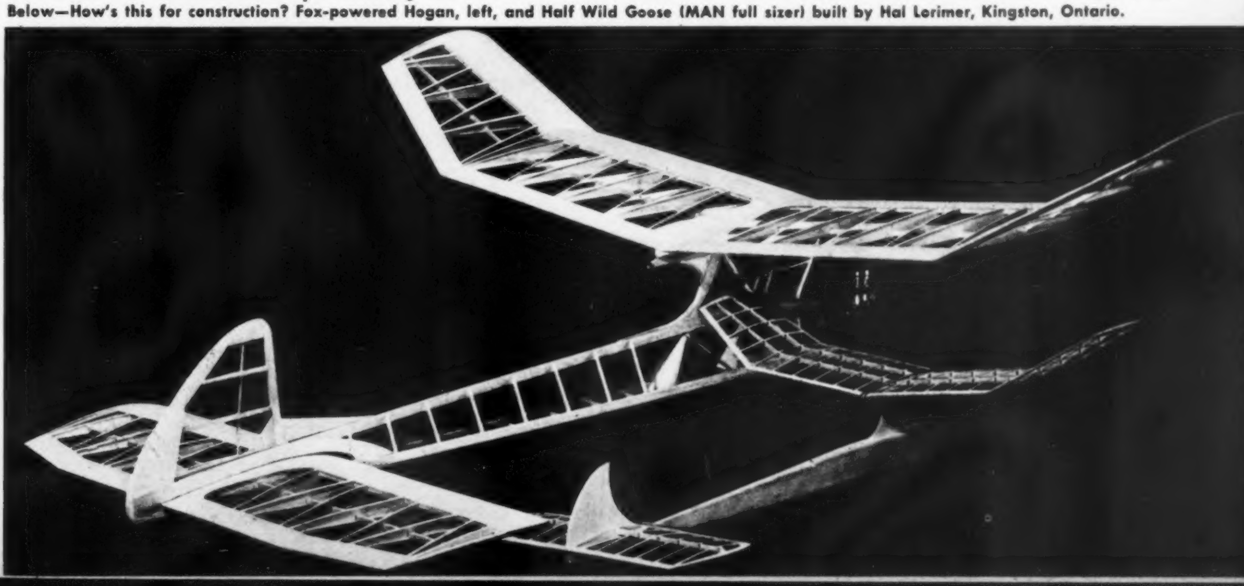
From MAN plans, Ken Mosby built real looking Albatross WW I fighter. It's a tether job with Baby Spitfire engine. Friend Joseph Hirl snapped pic.

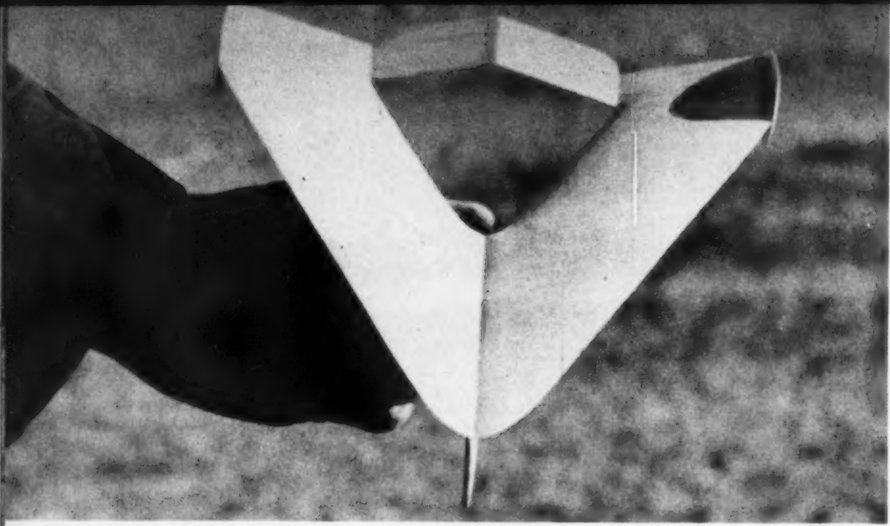


From Jerusalem, Israel, Naftali Kadmon travels to European meets. Goes in for low aspect ratio wings on Nordics and retractable towing hooks.

Introducing couple of Model Airplane Doctors, Easton, Pa.: Ray Volkert, left, Nelson Itterley. The airplanes are Civy Boys based upon MAN plans.

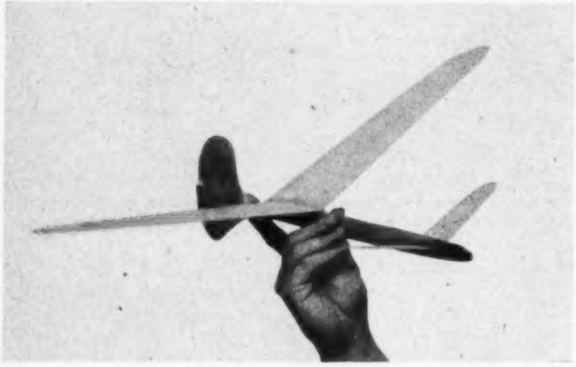
Below—How's this for construction? Fox-powered Hogan, left, and Half Wild Goose (MAN full sizer) built by Hal Lorimer, Kingston, Ontario.





Toss gliders afford a cheap method of making preliminary tests. This odd all-balsa number was to check the feasibility of the general shape of things for future free flight and controlline airplanes.

It PAYS to be ORIGINAL



Successful outdoor type of hand-launched glider that averaged 55 seconds in still air. Jobs fly easily enough, but usually require development.

Conventional, Paul terms this push-pull. Note folding propellers both ends of this ambitious rubber Wakefield. Motor run 150 seconds old rule.

That heartbroken look resulted from failure of this quickly thrown together push-pull canard to make good flight. How else do you find out?

▶ Whenever we build some unusual design, at least one model builder will ask us why we made it. The answer is always the same: originality pays off.

In each type of model the nature of the performance varies and, in many instances, the method by which it is to be achieved also varies. So one thing is certain: if performance is to be improved, there must be a constant evolution of ideas.

Take free flight designs. For years a free flight was not a contest model unless it had a pylon. Mind you, we are not trying to minimize the pylon, but do point out that a pylon is not necessarily the pre-requisite for peak performance. Many times, better performance can be attained with other types of configuration or by an approach other than the conventional tractor arrangement.

Forerunner (see picture), representing quite a different approach, had extremely good performance. With engines of .049 to .090 cu. in. displacement, flight averages in dead air on a 15-second engine run ranged from 2:15 to 2:30. One model was built for sport using an Infant .020 and flew well despite a weight of nearly 5 oz. and a wing area of 200 sq. in.

That Forerunner had a high degree of stability stemmed from the fact that the forces tending to displace the model were more closely assembled about the center of gravity. With such an arrangement, the adjustment of a model is simplified and the hazard of spinning-in under high power is virtually eliminated.

Another beneficial feature was the laminar flow airfoil section of the wing. The highest point of maximum camber was 60 per cent aft of the wing's leading edge, and at that point the maximum thickness was eight per cent of the wing chord.

A new design underway will feature several modifications. Another laminar flow section will be utilized, but will feature moderate undercamber. While the same proportion of stab area will be used, the camber thickness will be increased and the stab mounted lower with relation to the wing. The primary reason for these modifications is the decreased effectiveness of the stab deriving from the thin concentrated wake produced aft of the laminar flow airfoil section, which is in sharp contrast to the wide diffused wake produced by airfoil sections in general use.

To mount the tail surfaces in line with, slightly above, or below, the wing reference line may reduce stab efficiency enough to discount any advantage that may have been obtained by using such an airfoil section. In addition, the difficulty of maintaining longitudinal trim will be increased.

To tackle the problem of high performance in free flight from another angle, we tried a design with exceptionally high

And what do we have here? Originally towline glider, this crate soon sprouted a pylon-mounted engine, detachable for flying by either method.

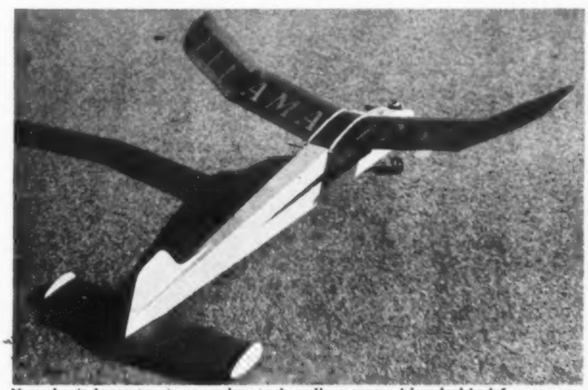
power for its size: an .074-powered swept-forward wing design of only 115 sq. in. projected wing area. When the model is in a turn, the swept-forward wing is generating more lift on the wing panel inside the turn than on the outside panel. With dihedral acting in the same way, corrective forces tending to restore the model to the desired flight path are increased. The long tail moment arm and other features of the Forerunner were maintained.

The ability to handle high power was substantiated during flight tests, which demonstrated a higher rate of climb than that of Forerunner. Flight averages were over the two minute mark. But the model proved difficult to control in a wind, and we finally came to consider the swept-forward wing a detriment because, when displaced, it tended to increase that displacement.

Our first attempt at a delta was in Half-A controlline design capable of speed above 80 mph. Handling qualities were good. Span was 3/4 in.; length, 9-1/2 in.

Begining with a hand-launched glider, we worked out proportions of surfaces, dihedral angles, and angular set-up between the tips and the main supporting surface. Performance proved very good. The only additional modification was a change in downthrust from (*Continued on page* 47)

This novel creation looks like a tail-first glider at quick glance but isn't that a propeller blade peeping out behind the wing? But of course!



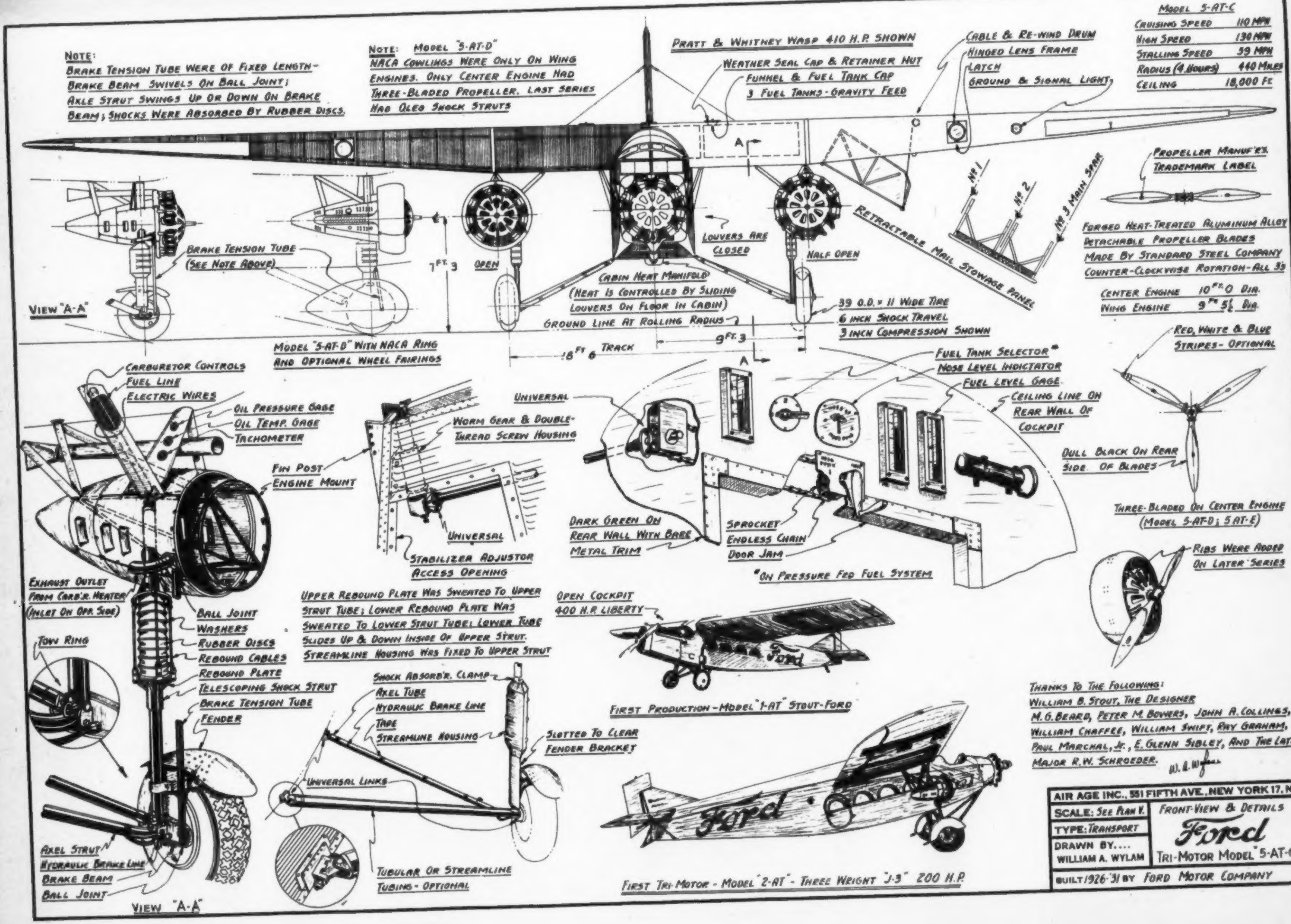
You don't have to use a pylon to handle power, idea behind forerunner. Half-A averaged up to 2:30 on 15 sec. Other job had .074 on 115 sq. in.

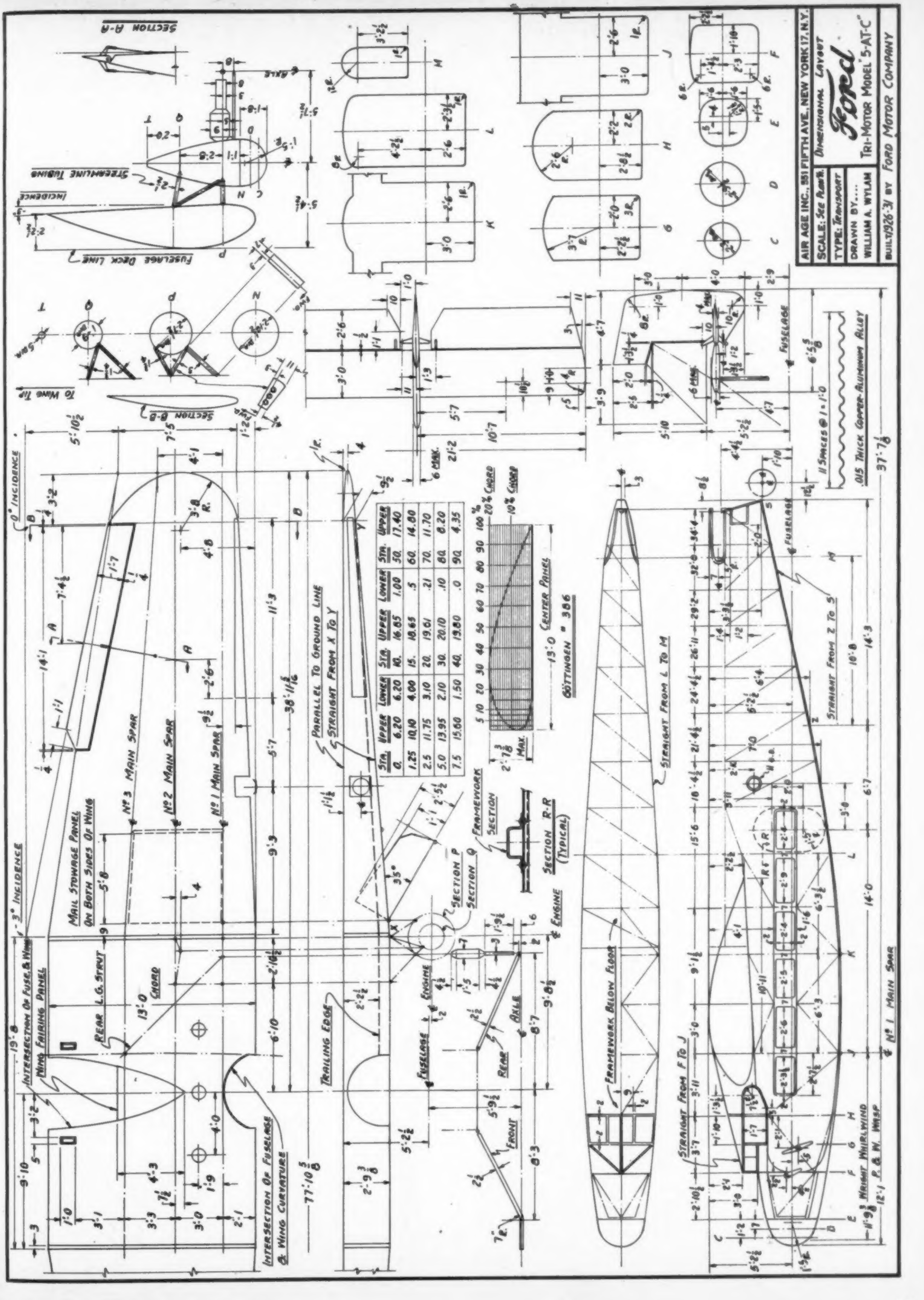
by PAUL E. DEL GATTO

▼

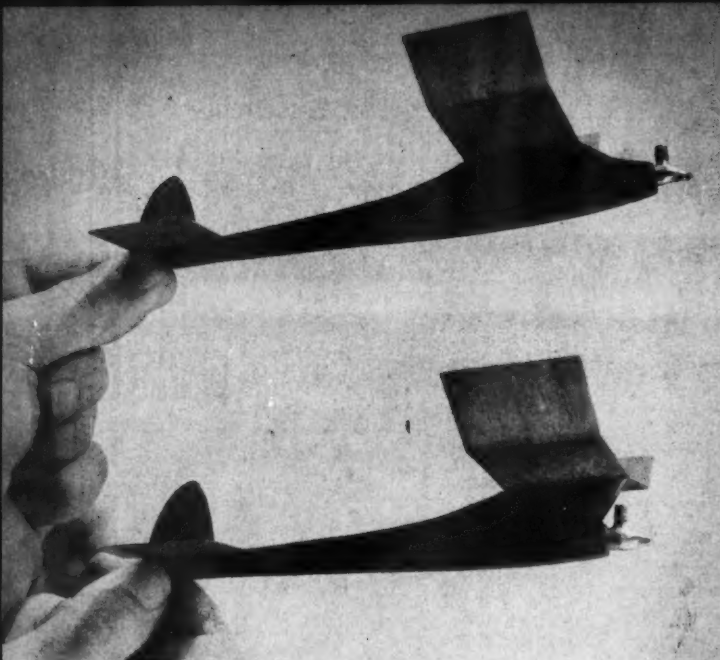
Why do some people experiment? To be different? Or is there a method in their madness? Even if you don't fully agree with the author's ideas, fellow experimenter, you'll have to agree that this one is having fun. He says it is so!

Below—Lack of stability in asymmetrical sidewinder ukies—how we doing, pal?—led to engine nacelle on wing, rather than the root, or was it tip? The boom at tip, root, no tip, supported the stab.


NOTE:
BRAKE TENSION TUBE WERE OF FIXED LENGTH-
BRAKE BEAM SWIVELS ON BALL JOINT;
AXLE STRUT SWINGS UP OR DOWN ON BRAKE
BEAM; SHOCKS WERE ABSORBED BY RUBBER DISCS.
NOTE: MODEL "5-AT-D"
NACA COWLINGS WERE ONLY ON WING
ENGINES. ONLY CENTER ENGINE HAD
THREE-BLADED PROPELLER. LAST SERIES
HAD OLEO SHOCK STRUTS
PRATT & WHITNEY WASP 410 H.P. SHOWN
WEATHER SEAL CAP & RETAINER NUT
FUNNEL & FUEL TANK CAP
3 FUEL TANKS-GRAVITY FEED
CABLE & RE-WIND DRUM
HINGED LENS FRAME
LATCH
GROUND & SIGNAL LIGHT
MODEL 5-AT-C
CRUISING SPEED 110 MPH
HIGH SPEED 130 MPH
STALLING SPEED 59 MPH
RADIUS (4 HOURS) 440 MILES
CEILING 18,000 FT.
PROPELLER MANUF'ERS. TRADEMARK LABEL
FORGED HEAT-TREATED ALUMINUM ALLOY
DETACHABLE PROPELLER BLADES
MADE BY STANDARD STEEL COMPANY
COUNTER-CLOCKWISE ROTATION-ALL 3'S
CENTER ENGINE 10 FT. 0 DIA.
WING ENGINE 9 FT. 5½ DIA.
Nº 1
Nº 2
Nº 3 MAIN SPAR
RETRACTABLE MAIL STOWAGE PANEL
A
BRAKE TENSION TUBE
(SEE NOTE ABOVE)
VIEW "A-A"
7 FT. 3
OPEN
LOUVERS ARE CLOSED
HALF OPEN
CABIN HEAT MANIFOLD
(HEAT IS CONTROLLED BY SLIDING
LOUVERS ON FLOOR IN CABIN)
GROUND LINE AT ROLLING RADIUS
39 O.D. x 11 WIDE TIRE
6 INCH SHOCK TRAVEL
3 INCH COMPRESSION SHOWN
MODEL "5-AT-D" WITH NACA RING
AND OPTIONAL WHEEL FAIRINGS
18 FT. 6 TRACK
9 FT. 3
RED, WHITE & BLUE
STRIPES - OPTIONAL
CARBURETOR CONTROLS
FUEL LINE
ELECTRIC WIRES
OIL PRESSURE GAGE
OIL TEMP. GAGE
TACHOMETER
FIN POST
ENGINE MOUNT
WORM GEAR & DOUBLE-
THREAD SCREW HOUSING
UNIVERSAL
STABILIZER ADJUSTOR
ACCESS OPENING
FUEL TANK SELECTOR*
NOSE LEVEL INDICTATOR
FUEL LEVEL GAGE
CEILING LINE ON
REAR WALL OF
COCKPIT
DULL BLACK ON REAR
SIDE OF BLADES
DARK GREEN ON
REAR WALL WITH BARE
METAL TRIM
SPROCKET
ENDLESS CHAIN
DOOR JAM
*ON PRESSURE FED FUEL SYSTEM
THREE-BLADED ON CENTER ENGINE
(MODEL 5-AT-D; 5 AT-E)
RIBS WERE ADDED
ON LATER SERIES
EXHAUST OUTLET
FROM CARB'R. HEATER
(INLET ON OPP. SIDE)
BALL JOINT
WASHERS
RUBBER DISCS
REBOUND CABLES
REBOUND PLATE
TELESCOPING SHOCK STRUT
BRAKE TENSION TUBE
FENDER
TOW RING
UPPER REBOUND PLATE WAS SWEATED TO UPPER
STRUT TUBE; LOWER REBOUND PLATE WAS
SWEATED TO LOWER STRUT TUBE; LOWER TUBE
SLIDES UP & DOWN INSIDE OF UPPER STRUT.
STREAMLINE HOUSING WAS FIXED TO UPPER STRUT
OPEN COCKPIT
400 H.P. LIBERTY
FIRST PRODUCTION - MODEL "1-AT" STOUT-FORD
SHOCK ABSORB'R. CLAMP
AXEL TUBE
HYDRAULIC BRAKE LINE
TAPE
STREAMLINE HOUSING
SLOTTED TO CLEAR
FENDER BRACKET
UNIVERSAL LINKS
TUBULAR OR STREAMLINE
TUBING - OPTIONAL
AXEL STRUT
HYDRAULIC BRAKE LINE
BRAKE BEAM
BALL JOINT
VIEW "A-A"
Ford
FIRST TRI-MOTOR - MODEL "2-AT" - THREE WRIGHT "J-3" 200 H.P.
THANKS TO THE FOLLOWING:
WILLIAM B. STOUT, THE DESIGNER
M.G. BEARD, PETER M. BOWERS, JOHN A. COLLINGS,
WILLIAM CHAFFEE, WILLIAM SWIFT, RAY GRAHAM,
PAUL MARCHAL, JR., E. GLENN SIBLEY, AND THE LATE
MAJOR R.W. SCHROEDER.
AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.
SCALE: SEE PLAN V.
TYPE: TRANSPORT
DRAWN BY....
WILLIAM A. WYLAM
FRONT-VIEW & DETAILS
Ford
TRI-MOTOR MODEL "5-AT-C"
BUILT 1926-'31 BY FORD MOTOR COMPANY



STA.	UPPER	LOWER	STA.	UPPER	LOWER	STA.	UPPER
0.	6.20	6.20	10.	16.65	1.00	50.	17.40
1.25	10.10	4.00	15.	18.65	.5	60.	14.80
2.5	11.75	3.10	20.	19.61	.21	70.	11.70
5.0	13.95	2.10	30.	20.10	.10	80.	8.20
7.5	15.60	1.50	40.	19.80	.0	90.	4.35

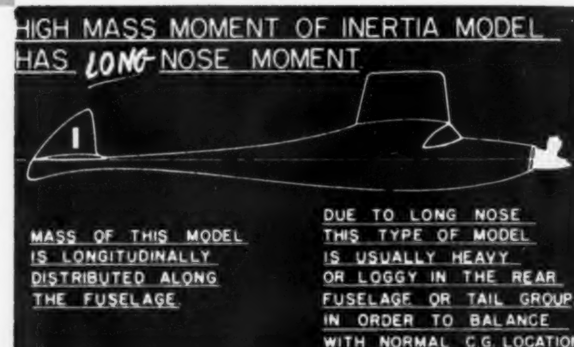


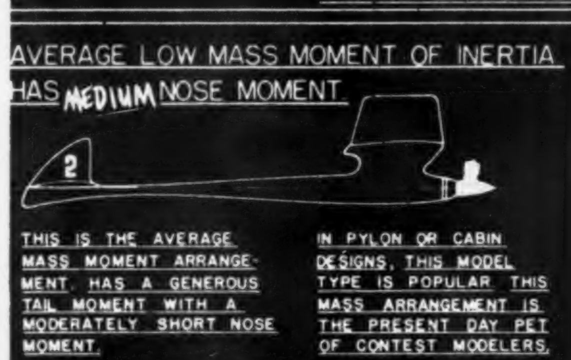
Recovery to glide after stall was much better with lower, shorter nose model; also, the destabilizing effect of spinning prop is much reduced.

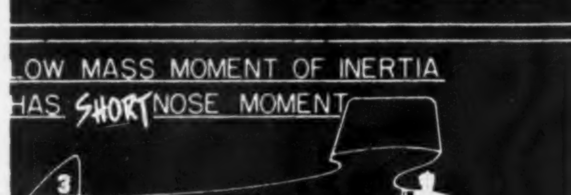
TAME That Crazy FREE FLIGHT

By PAUL GILLIAM

Do you believe that a fuselage is a chunk of wood to connect the wing with the tail? Or that design is sorcery? This expert advances some simple arguments to cut down crack-ups.







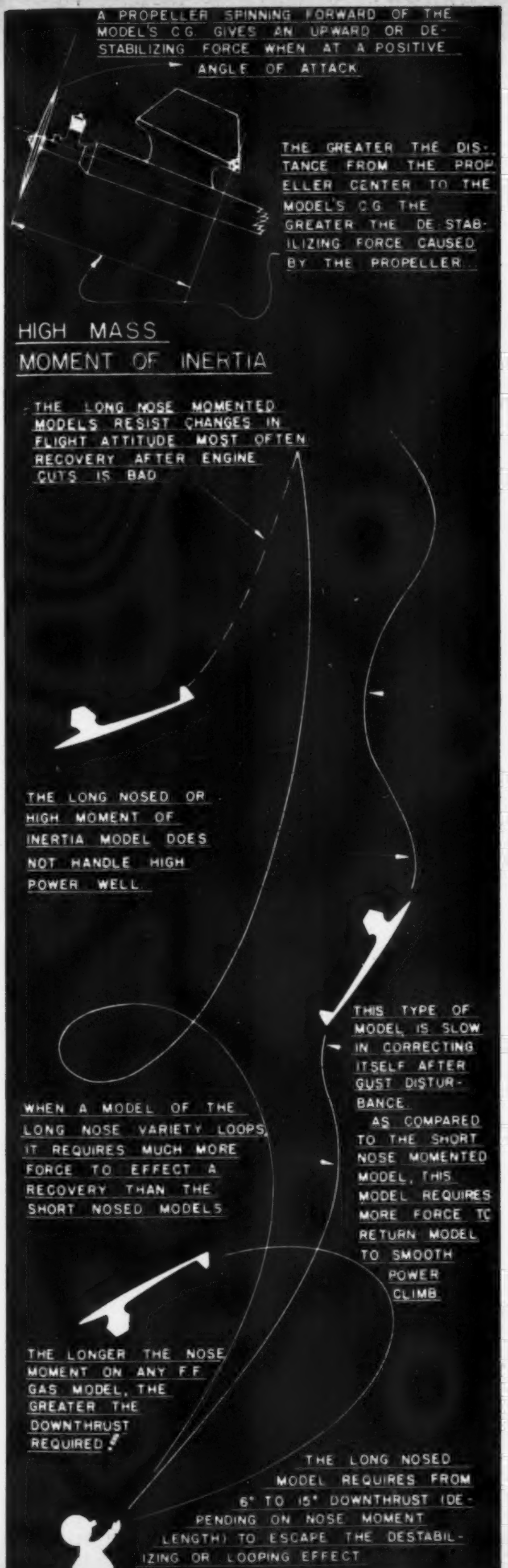
True, free flight design isn't a dark, deep secret. Yet there is much to be learned about our over-powered models; more than just to assume that all we need is some sort of wing and stabilizer to have a successfully high-powered free flight machine.

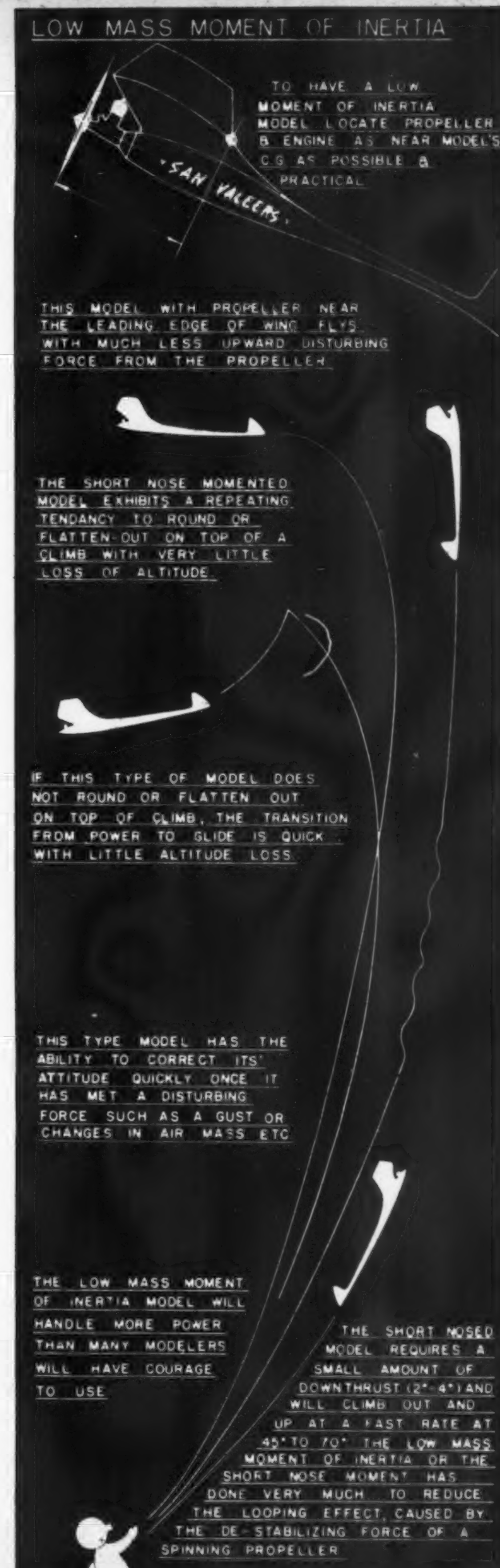
Many modelers over the country have been able to design a good free flight ship. Some of their models were designed from the motivation that they, the designers, knew what they were doing. When they flew this design, it more or less performed as they had imagined it would. On the other hand, there are just as many, or more, modelers who try the "lark in the dark" method to design a good ship. This latter mentioned method of design sometimes reaps good results, while more often than not many free flight flops develop. We must agree that there is nothing wrong in designing a free flight with little more data or material at hand than a 6-ft. piece of butcher paper and what can be remembered from someone's fine flying model we saw last summer that we liked well enough to copy.

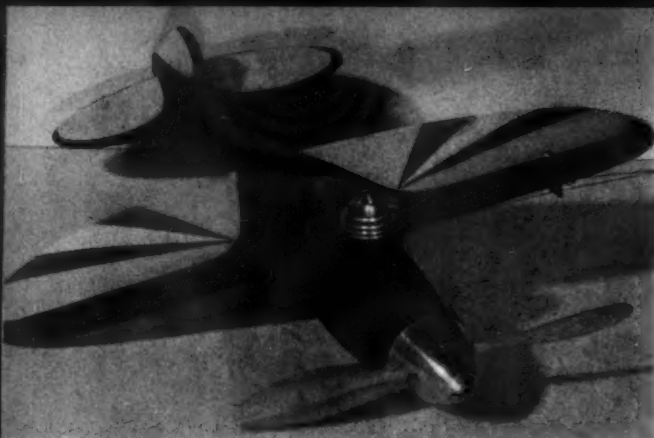
Often it happens that the designer who uses this blind method comes up with a terrific ship that causes mild excitement; but, to the dismay of many, including the designer, the next models of this design may fall into a furrow of mediocrity. To draw a parallel, we know that in order for a chef to concoct a good pot of soup he needs, first, the good basic ingredients. And then he needs to know how to blend those ingredients.

This writer firmly believes that there is no mystery in free flight design—if we can drop the "mystery" or "anything will fly" attitude when we come to the drafting table to create on paper a hot-climbing, free flight gem. There is considerably more to this chore of designing a well performing free flight than to assume that the fuselage is just a physical hunk of balsa connected on each end to some sort of wing and tail. In free flight design, there are few secrets. At the same time, we know there are plenty of proven facts that will help a designer put into a model certain features that ring a bell on the flying field.

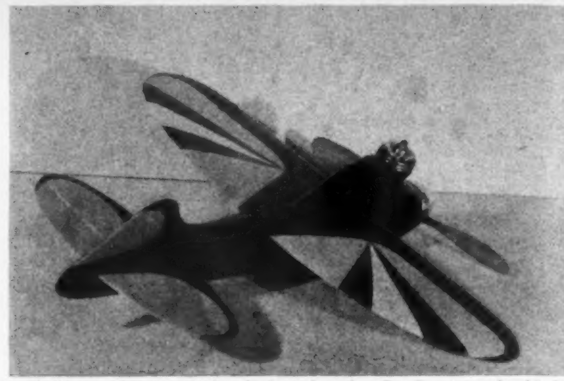
In the recent past, we were told that the fuselage was relatively unimportant to our basic design set-up. Some have even said that a fuselage for a free flight is merely a lever to contain a wing and stab. We (*Continued on page* 31)


A PROPELLER SPINNING FORWARD OF THE MODEL'S C.G. GIVES AN UPWARD OR DE-STABILIZING FORCE WHEN AT A POSITIVE ANGLE OF ATTACK
THE GREATER THE DISTANCE FROM THE PROPELLER CENTER TO THE MODEL'S C.G. THE GREATER THE DE-STABILIZING FORCE CAUSED BY THE PROPELLER
HIGH MASS MOMENT OF INERTIA
THE LONG NOSE MOMENTED MODELS RESIST CHANGES IN FLIGHT ATTITUDE. MOST OFTEN RECOVERY AFTER ENGINE CUTS IS BAD
THE LONG NOSED OR HIGH MOMENT OF INERTIA MODEL DOES NOT HANDLE HIGH POWER WELL
THIS TYPE OF MODEL IS SLOW IN CORRECTING ITSELF AFTER GUST DISTURBANCE. AS COMPARED TO THE SHORT NOSE MOMENTED MODEL, THIS MODEL REQUIRES MORE FORCE TO RETURN MODEL TO SMOOTH POWER CLIMB
WHEN A MODEL OF THE LONG NOSE VARIETY LOOPS, IT REQUIRES MUCH MORE FORCE TO EFFECT A RECOVERY THAN THE SHORT NOSED MODELS
THE LONGER THE NOSE MOMENT ON ANY F.F. GAS MODEL, THE GREATER THE DOWNTHRUST REQUIRED!
THE LONG NOSED MODEL REQUIRES FROM 6° TO 15° DOWNTHRUST (DEPENDING ON NOSE MOMENT LENGTH) TO ESCAPE THE DESTABILIZING OR LOOPING EFFECT


LOW MASS MOMENT OF INERTIA
TO HAVE A LOW MOMENT OF INERTIA MODEL LOCATE PROPELLER & ENGINE AS NEAR MODEL'S C.G. AS POSSIBLE & PRACTICAL
"SAN VALEERS"
THIS MODEL WITH PROPELLER NEAR THE LEADING EDGE OF WING FLYS WITH MUCH LESS UPWARD DISTURBING FORCE FROM THE PROPELLER
THE SHORT NOSE MOMENTED MODEL EXHIBITS A REPEATING TENDANCY TO ROUND OR FLATTEN-OUT ON TOP OF A CLIMB WITH VERY LITTLE LOSS OF ALTITUDE
IF THIS TYPE OF MODEL DOES NOT ROUND OR FLATTEN OUT ON TOP OF CLIMB, THE TRANSITION FROM POWER TO GLIDE IS QUICK WITH LITTLE ALTITUDE LOSS
THIS TYPE MODEL HAS THE ABILITY TO CORRECT ITS' ATTITUDE QUICKLY ONCE IT HAS MET A DISTURBING FORCE SUCH AS A GUST OR CHANGES IN AIR MASS ETC
THE LOW MASS MOMENT OF INERTIA MODEL WILL HANDLE MORE POWER THAN MANY MODELERS WILL HAVE COURAGE TO USE
THE SHORT NOSED MODEL REQUIRES A SMALL AMOUNT OF DOWNTHRUST (2°-4°) AND WILL CLIMB OUT AND UP AT A FAST RATE AT 45° TO 70°. THE LOW MASS MOMENT OF INERTIA OR THE SHORT NOSE MOMENT HAS DONE VERY MUCH TO REDUCE THE LOOPING EFFECT, CAUSED BY THE DE-STABILIZING FORCE OF A SPINNING PROPELLER



Though the engine sits out in the breeze, individual builders can make minor modifications. Start with a 5 x 6 prop. Original had 4-1/2 x 8 prop.



For lightness, brush with hot fuelproof sealer. But for strength, this job was covered with 17-cent silk handkerchief. Plane is hand-launched.

li'l speed merchant...

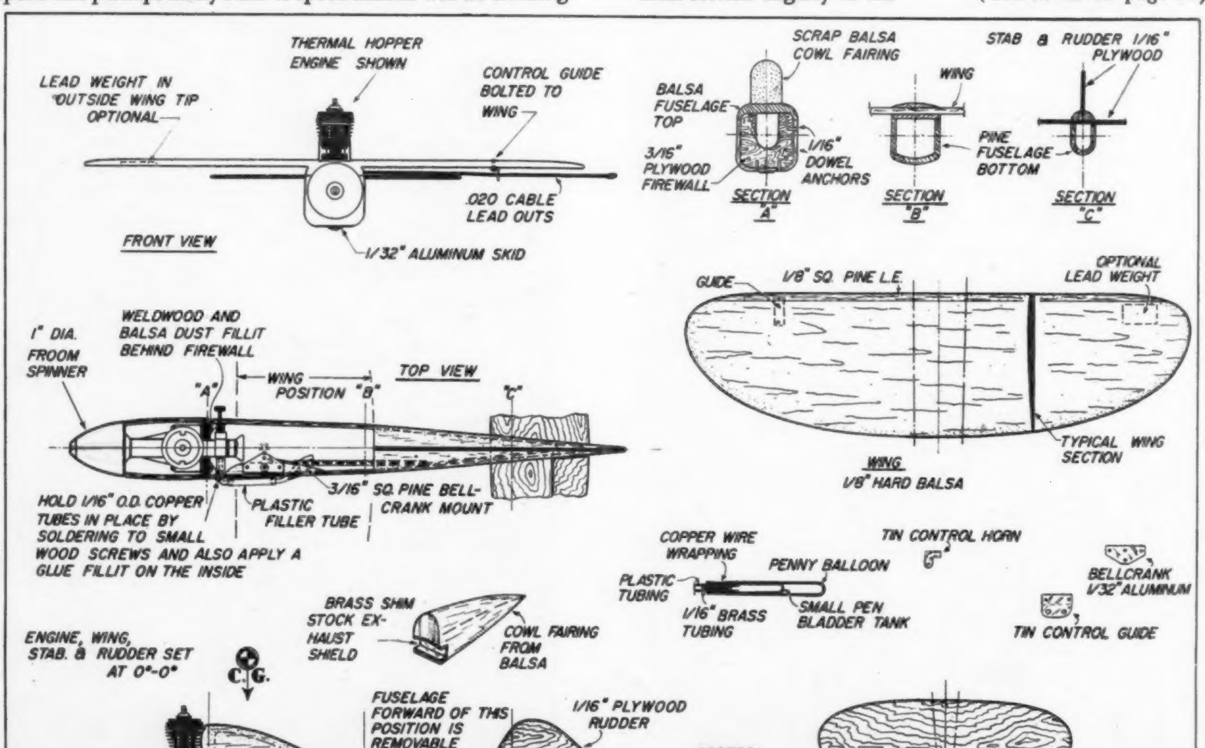
By EARL L. CAYTON

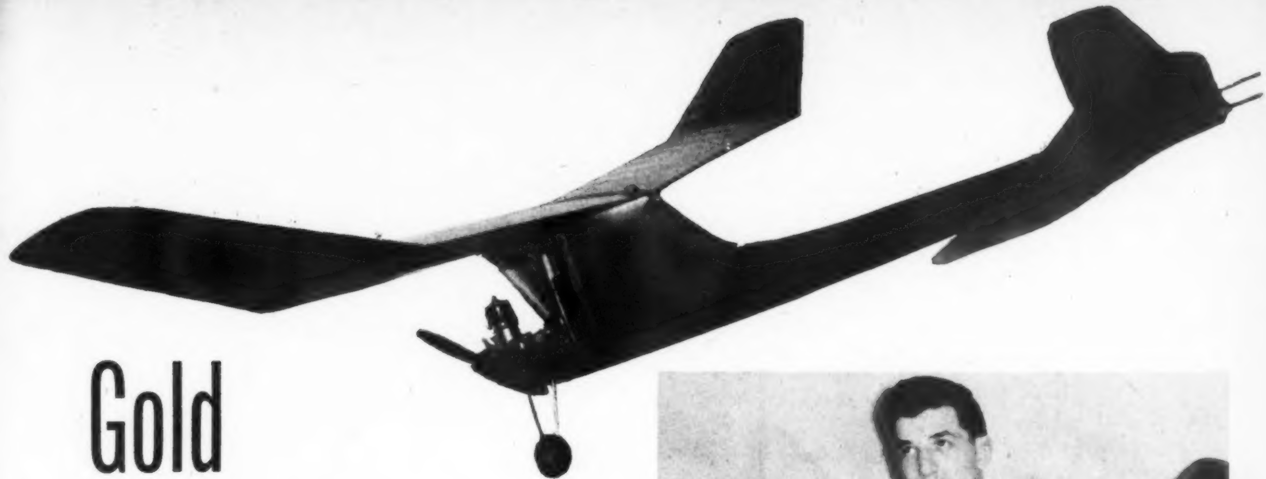
Here's your chance to try speed. Inexpensive, easy to build, a Thermal Hopper for power.

▶ Li'l Speed Merchant is a fast li'l Half-A speed job which possesses great stability, ruggedness, and that cute charm associated with Half-A models. Half-A speed, although a newer class, is catching hold in popularity all over the country and especially with the beginners in speed through its ease of construction and lower cost of materials. Although Li'l Speed Merchant has yet to clock much over 80 mph, much knowledge is constantly being gained in this class of speed and perhaps many Half-A speed models will be clocking over the 100 mark by the time this goes to print. Construction is pretty simple in most respects and just a few evenings will be needed to add Li'l Speed Merchant to your stable of model airplanes.

The original model was constructed all from wood but this design may be simply modified for the use of a metal full pan or half pan. A Thermal Hopper engine was used in the original but any good hot Half-A engine may be used by changing the cross-section slightly at the (*Continued on page* 52)

FULL SIZE PLANS AVAILABLE. SEE PAGE 52.





Gold Dust...

by EDWARD MAHLER

Winner of 1953 Nationals Senior PAA Load event, this design has been going strong for eleven years. Should please pylon fans who want "load job."

Real contest hounds go in for simple, fast-build ships and Gold Dust is no exception. Even the stab halves have the same planform as wing tips.

PLANS ON FOLLOWING PAGES

Releasing timer, author prepares to release Gold Dust at last Nats. Fuselage is quickly assembled upon sheet balsa crutch. Plans one-third.

▸ The Gold Dust can fill a double roll in contest flying. It may be flown as a PAA Load ship or as a top notch free flight ship when flown without the 8 oz. dummy.

This ship is not an overnight design. It made its first appearance as a free flight in 1943. It placed in contests consistently and in 1947 made a record flight of 47 minutes.

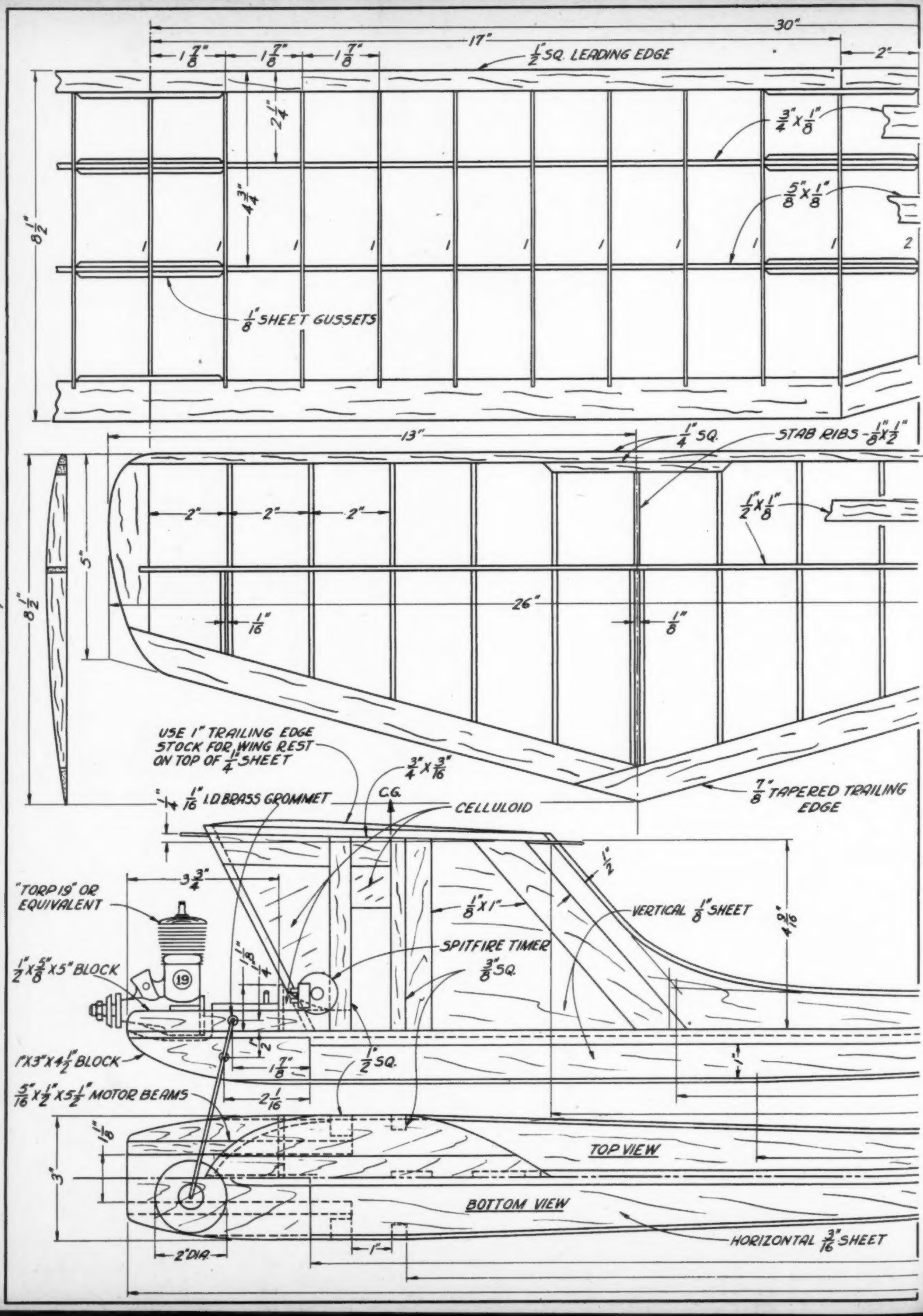
When I became interested in PAA Load I recalled that this ship was ideal for the purpose because of its pylon structure and simplicity and ruggedness of construction.

The Gold Dust weighs in at 30 oz. with the dummy and has a wing area of 464 sq. in. The stab area is 182 sq. in. The ship is balanced just behind the dummy. A Torp .19 engine will furnish sufficient power for a very fast climb.

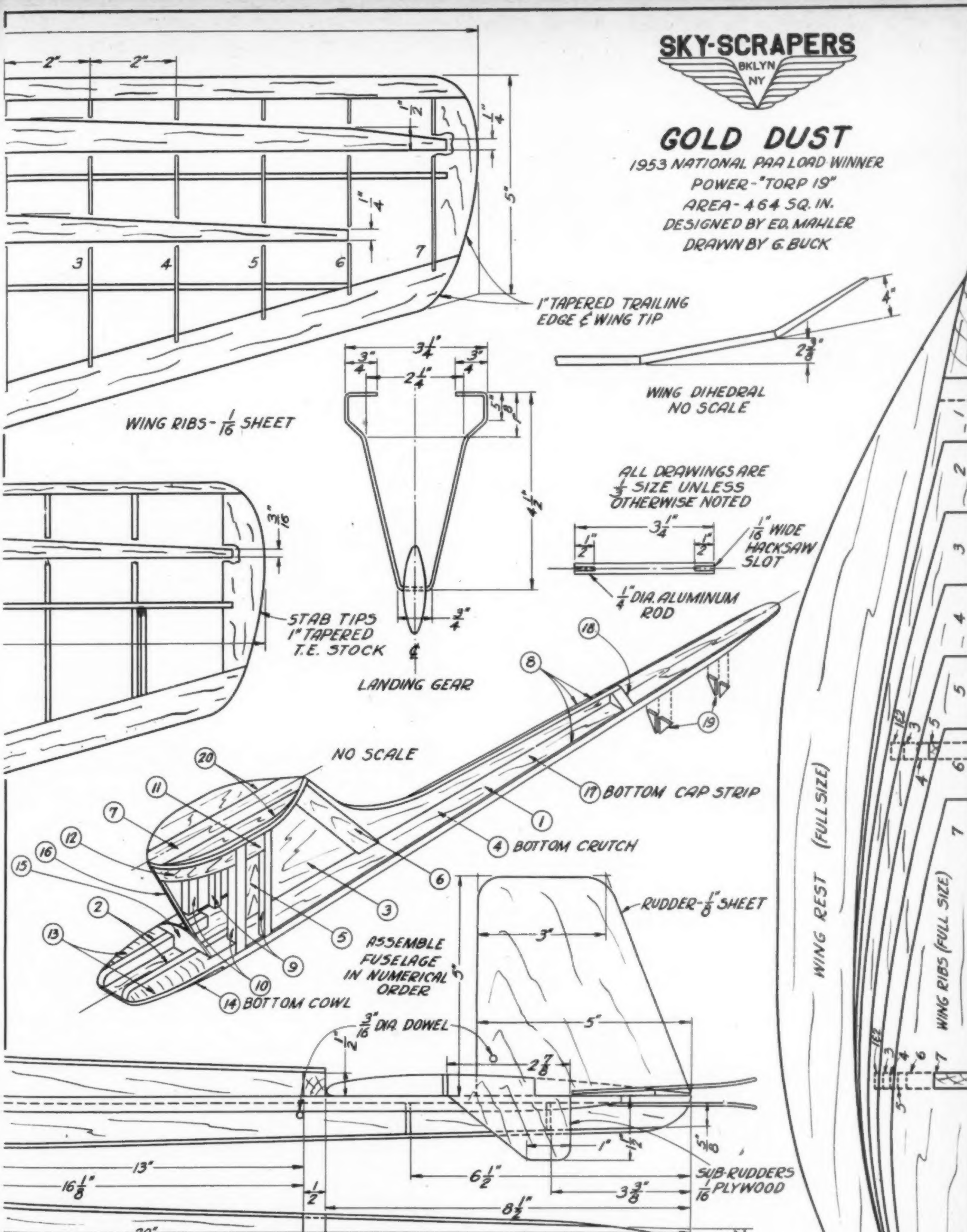
The fuselage construction is of the crutch type and as such does not require very much in the way of detailed instructions. The motor mounts are 5/16 x 1/2 x 5-1/2 in. long and are made of maple or any other hard straight-grained wood. The individual parts of the fuselage should be assembled in the numerical order given on the plans. Use any standard free flight fuel tank and mount as shown on the plans.

The landing gear is made of 1/16 dia. wire. A 3/32 in. dia. hole should be drilled into each side of the motor mounts in the location shown on the plans. A 1/16 in. interior diameter brass grommet should then be pressed into each hole. When the fuselage has been covered and doped drill a 1/4 in. dia. hole through the cowl block in the location shown to accept the slotted aluminum rod. When the landing gear is assembled pinch the slotted ends closed to hold the landing gear wire.

The individual parts of the wing are assembled in the normal manner by pinning the structure to the plans. When the cement has dried, remove the sections from the plan and recement all the joints. Then add (*Continued on page* 46)



30"
17"
2"
1 7/8"
1 7/8"
1 7/8"
1/2" SQ. LEADING EDGE
2 1/4"
4 3/4"
8 1/2"
3/4" X 1/8"
5/8" X 1/8"
1/8" SHEET GUSSETS
13"
1/4" SQ.
STAB RIBS - 1/8" X 1/2"
2"
2"
2"
1/2" X 1/8"
5"
8 1/2"
26"
1/16"
1/8"
USE 1" TRAILING EDGE STOCK FOR WING REST ON TOP OF 1/4" SHEET
3/4" X 3/16"
7/8" TAPERED TRAILING EDGE
1/16" I.D. BRASS GROMMET
C.G.
CELLULOID
"TORP 19" OR EQUIVALENT
3 3/4"
1/8" X 1"
VERTICAL 1/8" SHEET
4 9/16"
1/2" X 5/8" X 5" BLOCK
SPITFIRE TIMER
3/8" SQ.
19
1" X 3" X 4 1/2" BLOCK
1 7/8"
1/2" SQ.
1"
5/16" X 1/2" X 5 1/2" MOTOR BEAMS
2 1/16
1 1/8"
3"
TOP VIEW
BOTTOM VIEW
HORIZONTAL 3/16" SHEET
2" DIA.
1"

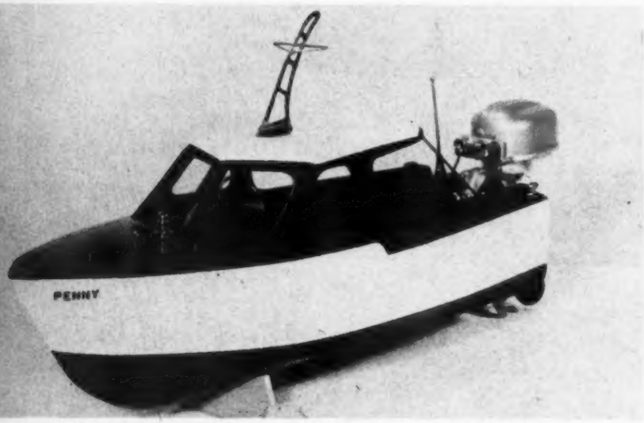

SKY-SCRAPERS
BKLYN NY
GOLD DUST
1953 NATIONAL PAA LOAD WINNER
POWER - "TORP 19"
AREA - 464 SQ. IN.
DESIGNED BY ED. MAHLER
DRAWN BY G. BUCK
1" TAPERED TRAILING EDGE & WING TIP
WING RIBS - 1/16 SHEET
WING DIHEDRAL NO SCALE
LANDING GEAR
ALL DRAWINGS ARE 1/4 SIZE UNLESS OTHERWISE NOTED
1/16 WIDE HACKSAW SLOT
1/4 DIA. ALUMINUM ROD
STAB TIPS 1" TAPERED T.E. STOCK
NO SCALE
17 BOTTOM CAP STRIP
4 BOTTOM CRUTCH
14 BOTTOM COWL
ASSEMBLE FUSELAGE IN NUMERICAL ORDER
RUDDER - 1/8" SHEET
3/16" DIA. DOWEL
SUB-RUDDERS 1/16 PLYWOOD
4 CAPSTRIPS 1/8" X 3/8"
1/8" SHEET TRIANGULAR BRACES
WING REST (FULL SIZE)
WING RIBS (FULL SIZE)

Fishing rod is the only thing missing from this picture! Imp engine shown is representative of electric type of outboard at hobby shop. The new gas engines mount same manner but on a larger boat.

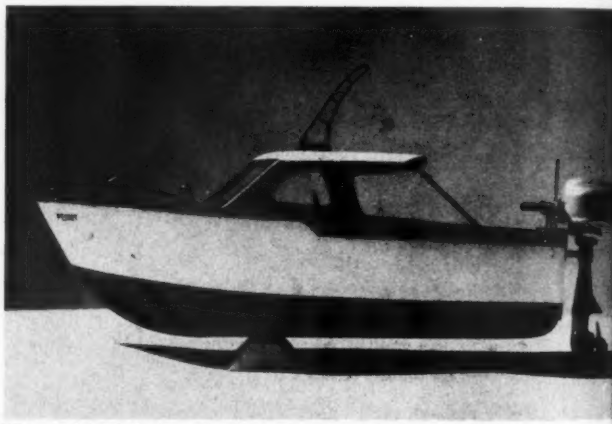
PENNY

By PAUL J. PALANEK

Take this little boat with you on your ROW sessions. Uses those battery-operated outboards. And it can be scaled up easily for Allyn or Atwood gas outboards.



Cleats, running lights, horn, antenna, are boat equipment items that can be added for super realism. Stuffing boxes, shafts, etc., not needed.



White hull, blue bottom, and red water line make Penny bright. Ah! Feel that sunshine, sparkling waters, and stuff? Can RC the gas version.

Editor's Note — *In response to a recent statement of MAN's future policy, a few readers objected to boat plans. In publishing Penny — an RC boat is also on hand — MAN would welcome comments. Whether or not occasional boats will be published in the future depends upon reader reaction.*

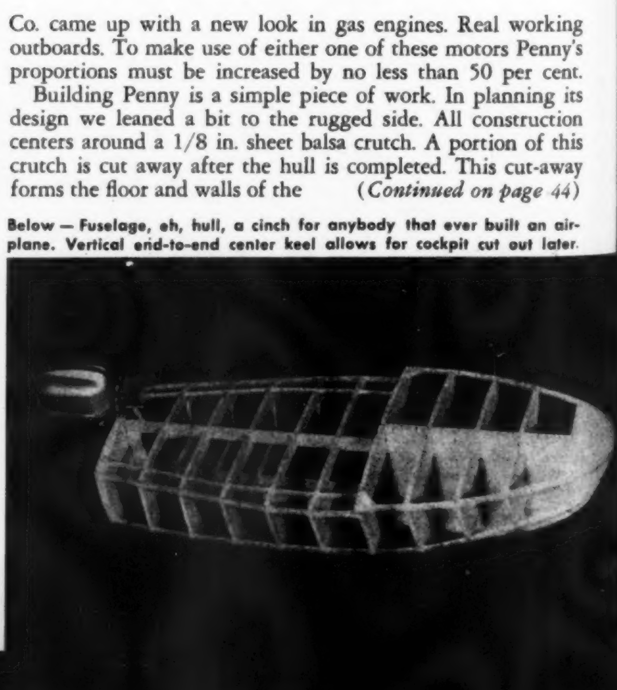
There are many among us who would be proud to own a luxurious cabin cruiser. Since to many this is a mere dream the next best thing is a sailing replica of this vision.

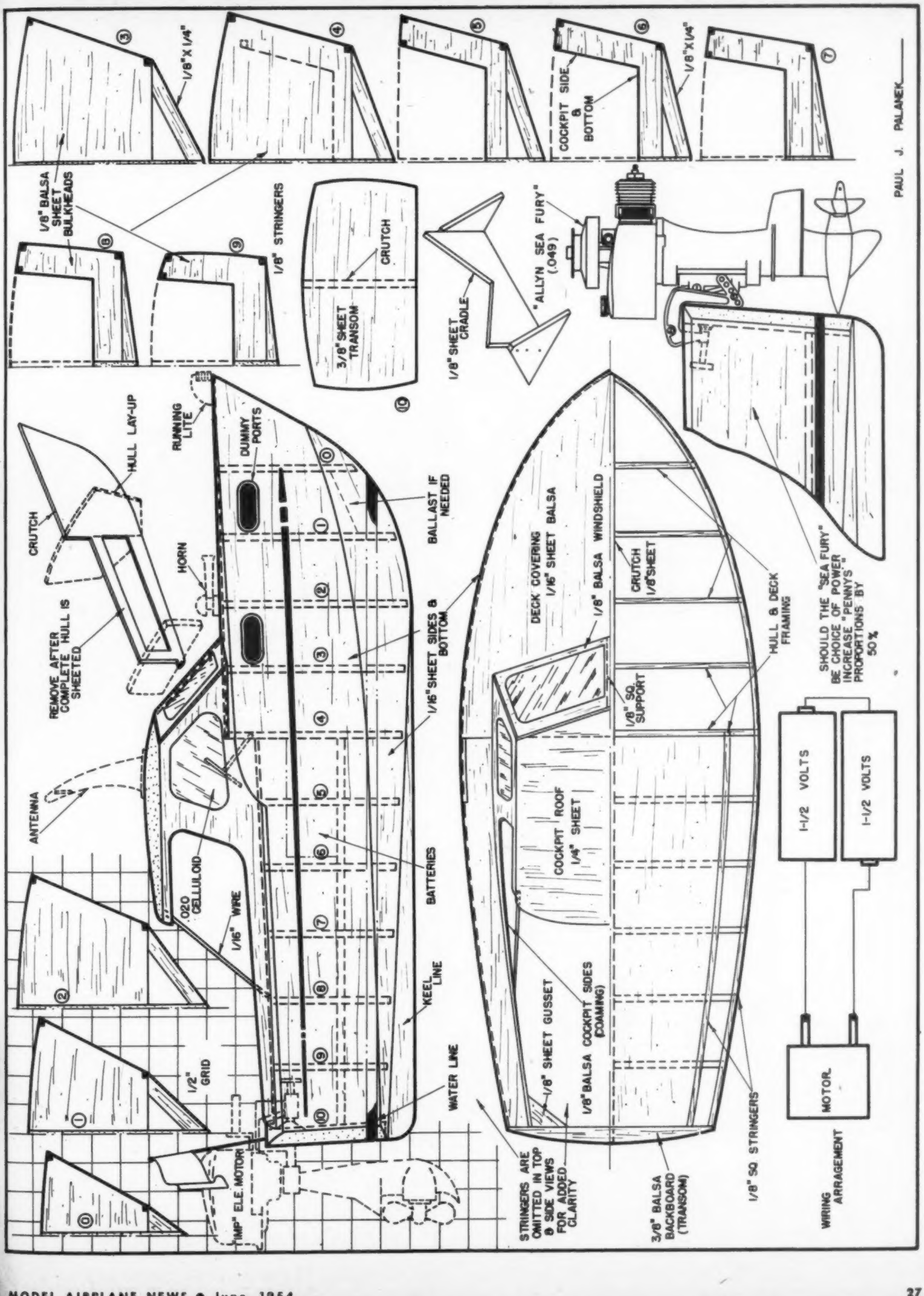
Penny is a steal of many ideas and lines, with a good many of her own thrown in. The model features an outboard in preference to an inboard arrangement for simple reasons. There is no stuffing box or misalined shafts to worry about, resulting in a dry hull. The miniature outboard gives the needed touch of realism; also sports a built-in reversing switch, The model is steered in typical outboard movements. Almost any closed circle is attained, by pre-setting prior to launching. On deck, as well as the cockpit roof, fittings such as cleats, horn, running lights and an antenna are mounted. Many of these die cast accessories are available at shops sporting boats, and boat fittings.

There are available a number of outboards of the electric type, such as the Imp and the Speed Master. Since the Imp was available to us locally we decided making use of it. Going a little farther, more recently Atwood Motors and Allyn Sales Co. came up with a new look in gas engines. Real working outboards. To make use of either one of these motors Penny's proportions must be increased by no less than 50 per cent.

Building Penny is a simple piece of work. In planning its design we leaned a bit to the rugged side. All construction centers around a 1/8 in. sheet balsa crutch. A portion of this crutch is cut away after the hull is completed. This cut-away forms the floor and walls of the (*Continued on page 44*)

Below — Fuselage, eh, hull, a cinch for anybody that ever built an airplane. Vertical end-to-end center keel allows for cockpit cut out later.

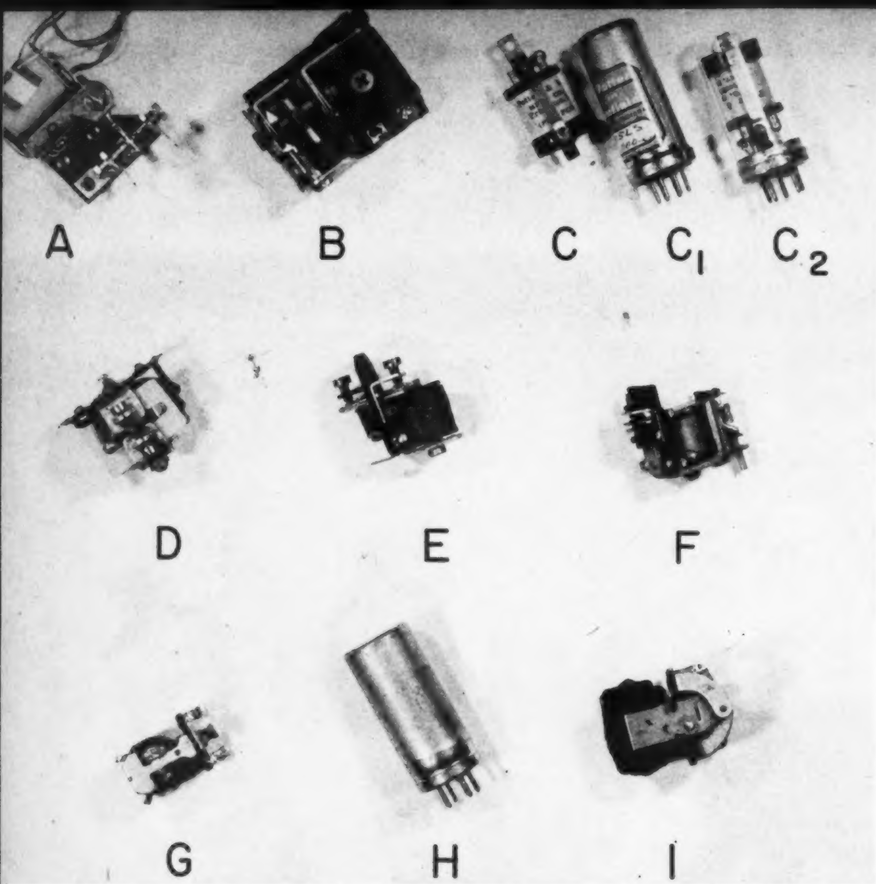




FULL SIZE PLANS AVAILABLE. SEE PAGE 52.

FOR MODELERS WH

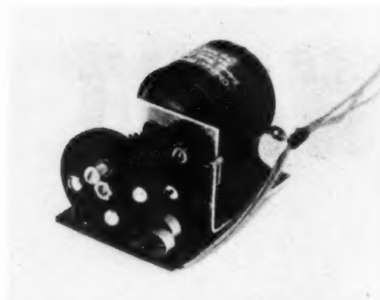
THE *Best...*



These are the relays analyzed and discussed in the copy. Middle row shows available English types.

Radio Control News

by E. J. LORENZ



DMECO servo. One right, two left, one neutral.

More fascinating info on how you can make your own printed circuits, round-up of relays, news.

▶ Last month we gave you a briefing on etched wiring as applied to model RC work. By this time most of you have seen some of the commercial equipment in the model field and in industry. It is our intent to familiarize you with the process so that you may turn out usable etched patterns for experimental receivers, transmitters, and various types of switches. So now let's get started on some basic experimental work. What do we need?

Following is a list of materials which we'll discuss, then, one at a time:

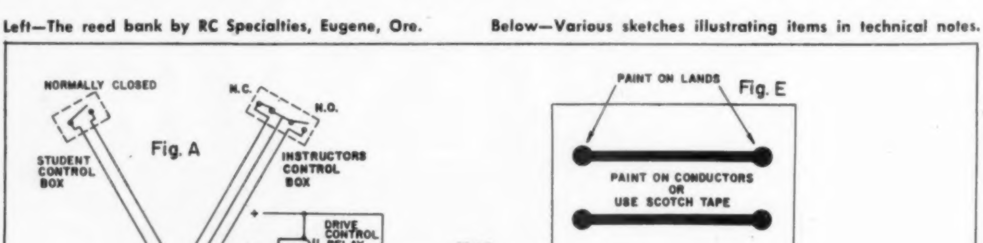
1. copper clad laminate generally 1/16 in. thick; 2. approximately 1/2-gallon 40 per cent solution ferric chloride; 3. a shallow glass dish; 4. small paint brush; 5. resist paint; 6. resist paint solvent; 7. roll of scotch tape.

1. Copper clad laminate is obtainable from the manufacturer in sheets 36 in. wide and up to 6 ft. long. However, Ace Model Supply of Higginsville, Mo., and Control Research of Hampton, Va., are the only RC model suppliers we know of at present who have this material in small pieces. The type of material known as XXP or XXXP in 1/16 in. thickness is best for most applications.

2. For etching copper, a 40 per cent solution of ferric chloride is used. This solution is obtainable, ready-mixed, from chemical supply houses or may be used by dissolving 7 oz. of lump ferric chloride (by weight) in 16 oz. of water. Be careful to keep this solution off most metal surfaces, such as copper, brass, aluminum, or iron, as its corrosion or etching properties are great. Mix and store in glass or porcelain containers. Since the lump ferric chloride is hydroscopic, or, in other words, highly sus- (*Continued on page* 50)

Left—The reed bank by RC Specialties, Eugene, Ore.

Below—Various sketches illustrating items in technical notes.



Tame That Crazy Free Flight

(*Continued from page 20*)

intend to show how important our fuselage really is to the success of our better free flight models. Study it first on the drawing board. How long will the fuselage be? What percentage of fuselage length do we want to be tail or rear fuselage moment? More important, what will our nose or forward fuselage moment be?

Here we go headlong into an almost completely unmentioned subject in the past: *mass moment of inertia.* To give a simple definition of mass moment of inertia as it applies to our basic model fuselage, it is the distribution of mass along the fuselage. Too, we may define mass moment of inertia as resistance to pitch acceleration. Let us reason out this mass moment theory in order to stay one step ahead of confusion.

The mass moment of a fuselage may be longitudinally high or low. We feel convinced that we can say many good things in behalf of the low moment of inertia, or (and this means the same thing) the short-nose moment on a model. On the other hand, very little can be said for the high mass moment of inertia, or a long-nose moment on a model. Low mass moment of inertia simply means a short-nose moment on a fuselage, while high mass moment of inertia means a long-nose moment.

Let us illustrate that it is possible that two models having the same areas and weight can have an alarming difference in mass moment of inertia. Let us assume that we have two Class B models weighing 30 oz. each. They each may have same balance point or center of gravity location, but these two models can differ in that, while one may have long-nose moment, the other may have a short-nose moment.

Now, we will try to show why the short-nose moment model is head and shoulders above its long-nose momented cousin. 1. the short-nose moment or low mass moment of inertia recovers from changes in flight altitudes quickly; 2. quick recovery in transition from power to glide; 3. short-nose moments are more stabilizing under power in that with the low moment of inertia the propeller is located nearer the CG.

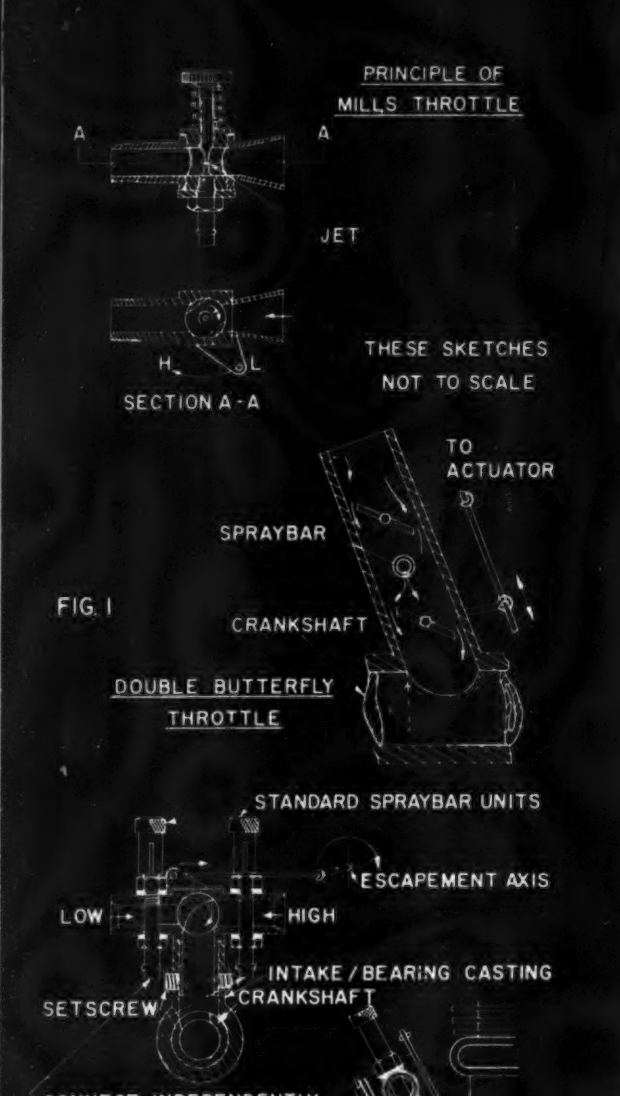
We can say little to merit the use of the long-nose moment, so here are its disadvantages: 1. the long-nose moment of inertia aggravates changes in flight attitude; 2. slower recovery in transition from power to glide; 3. the long-nose moment is a known aerodynamic destabilizing force.

To illustrate these "why" and "why-nots," let's probe a bit more. A force which tends to cause a model to continue in the direction of a disturbance is said to produce a de-stabilizing moment. A force which is in opposition to the disturbance is a stabilizing moment.

Let us assume that we have a model which is in straight level gliding flight that has been pitched by gusts into a nose-up attitude. Then, the force exerted by our lifting horizontal stabilizer tries to return our model to level flight. This produces a stabilizing moment.

Propellers, on the other hand, usually produce de-stabilizing moments. A propeller forward of the CG will produce a nose-up moment when at a positive angle of attack and a nose-down moment when at a negative angle of attack. These moments are de-stabilizing forces as compared with the effect of the horizontal stabilizer mentioned above.

A free flight model under power is usually flying at a moderately high angle of attack and consequently undergoes a strong de-stabilizing moment from the propeller. Most of us have learned this after more than our share of disastrous flights. Too, we know that this de-stabilizing force from the prop is reduced considerably by adding downthrust until our model lessens the de-stabilizing or looping effect.



Frank Adams, the actuator man, starts up .09 proportional job at the last Nationals. Receiver was Lorenz two-tuber. Ship took off very well.

the RC ENGINE

By E. C. MARTIN

It must be smooth running, reliable, flexible, unaffected by position; in other words, a good stunt airplane engine, with two-speed ability.

▶ Unlike stunt, team racing and speed flying, there is no clearly defined type of engine essential to successful RC applications. With radio controlled models becoming more common and more reliable, there is a definite trend toward specialization in model designs for the type of performance required, so that RC stunt, RC speed, and eventually RC team racing will become as common as the controlline variety, and each will reqūire a specific type of engine performance.

But for the majority of cat's whisker addicts at present, the engine should, above all, be dead reliable, smooth running and flexible, and be, as far as possible, unaffected by unusual attitudes and consequent fuel feed variation. Most of us want enough power to penetrate moderate head winds and quickly regain altitude between maneuvers, and at the same time be able to restrict power in order to maintain or lose height. It is also usual to employ a relatively large and heavy model in comparison with controlline applications, so that a fairly large diameter prop with wide blade area to displace plenty of air is desirable, and the engine should therefore produce high torque at low revs to drive it.

This latter consideration actually has very little meaning as radio control is not normally divided into displacement classes, so that the degree of lugging power can easily be obtained by using a large enough engine. However, more engine, more weight, and often more vibration, and—this may or may not be a disadvantage—in a spiral dive the big engine will reach a far higher bhp output as the resulting increase in rpm approaches the peak of the engine's power curve, and the spiral dive will be correspondingly more spectacular.

Let us assume, then, that we want the smallest engine for the job with all the characteristics mentioned and that it is adaptable to two-speed operation. A moderately long stroke and conservative porting are conducive to high torque production, and a small diameter but long air intake the simplest means of insuring reliable fuel feed, flexibility and trustworthy behavior. All the things, in fact, which go into a good stunt controlline engine, (*Continued on page* 49)

This de-stabilizing effect can best be cured by keeping the prop as near the CG as possible. A short nose on a model will cure a multitude of de-stabilizing ills, and we can do without a downthrust setting consisting of the prop spinner pointing downward in the direction of the landing gear.

A model with a long nose can be made to climb properly under constant power by using a very generous amount of downthrust. However, this same model will more likely have trouble at other power settings, and most surely in the transition from power to glide.

The free flight model with the short-nose moment can operate with much less downthrust and will be much less sensitive to changes in power during flight. This model will have fine recovery in the transition from power to glide.

A factor which strongly affects the ability of a model to recover from gusts, make smooth power to glide transitions, and display a sensitivity to thermal conditions, is the spanwise and longitudinal distribution of weight.

This effect is easily demonstrated with two "slip-on" type erasers and a pencil. First, slide the erasers on both ends of the pencil. Then twirl the pencil back and forth between the fingers like a baton. Now, move the erasers as close as possible to the middle area of the pencil and repeat the experiment. It is evident that the pencil with the erasers at each end has more resistance to change in direction of rotation than when the two erasers are moved closer together, even though the physical weight of the pencil and erasers has remained the same. The effect of moving the erasers closer together on the pencil's axis is to reduce what is called: *mass moment of inertia,* or *the resistance to angular acceleration.*

This principle requires, for quick recovery after an upsetting force, that a model have the *lowest possible moment of inertia,* with respect to the CG. To be practical, this is done by concentrating as much of the model's physical weight as is feasible at, or near, the CG. Even with only high school physics, we are able to see that the short-nose moment or the low moment of inertia model is destined to be our high-powered pet.

Some readers, possibly, are questioning what we have said, and could ask: If the short-nosed models are so good, why do the long-nosed ones even fly? The long-nosed models will fly well under high power *if* they never encounter a disturbing force; almost all long-nosed momented models will perform well at *slow speeds.* Our Wakefield or rubber-powered models have long-nose moments, or high mass moments of inertia, from the rubber power weight distributed along the entire fuselage. We know that the average contest type rubber model flies smoothly with good stability. This explanation of the rubber model may seem contradictory to our mass moment of inertia theory. Actually it isn't, since we also know that these rubber-powered models with the long-nose moments fly at very slow speeds under power as compared with the high speed gas model.

For the hot-powered, free flight gassie, we need to use a nose-moment that is as short as can be practical. By practical, we mean we should place the prop blade at the leading edge of the wing. After we do this, it is an easy matter to decide where the firewall for the engine will be located on the fuselage. If you are the adventurous type creator-builder, and if the pylon or wing mount is high enough, let the propeller spin an inch or two behind the wing's leading edge. The closer the prop is located rearward toward the CG, the better. It is difficult to go wrong since almost all aerodynamic data and visual flight checks are on your side.

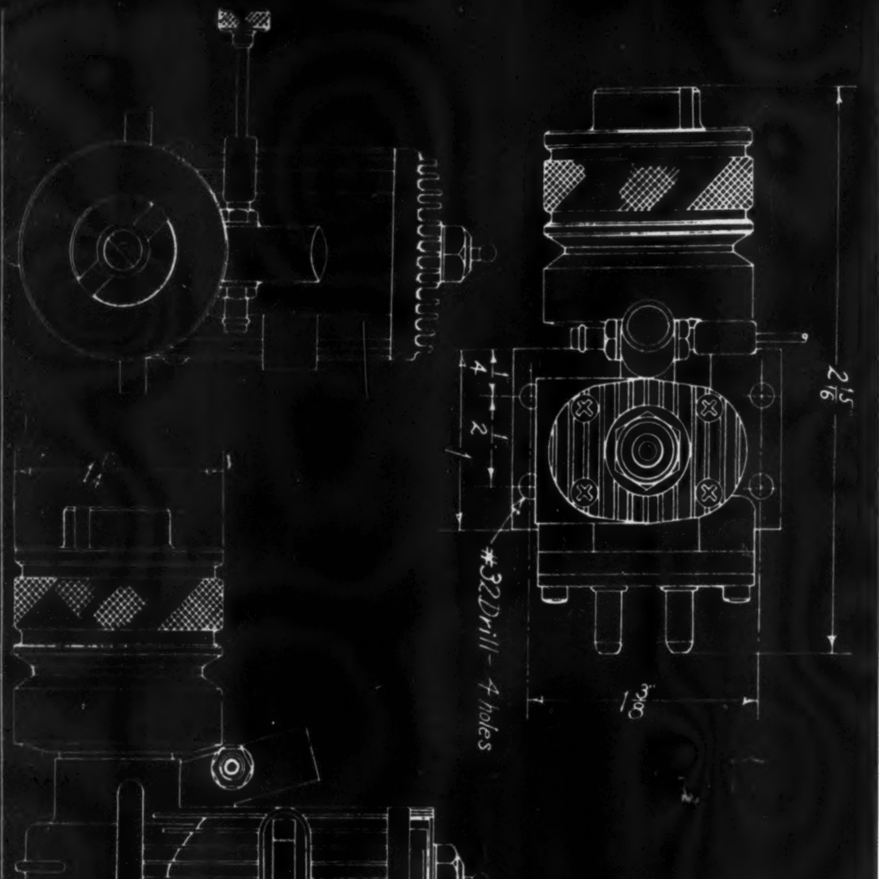
Remember that while we are striving for a short-nose moment, we also want to retain for an optimum model as long a tail moment as we can have, yet not balance the model more rearward than 100 per cent wing chord. Let us also remember that a heavy engine is in our favor. If our present day model engines weighed twice as much as they do we could have short-nose moments on our models with the prop barely clearing the wing's leading edge and yet still have a long tail moment.

Here are the ingredients or the design data that is important for a practical high-powered free flight ship: 1. low mass moment of inertia, or short-nose moment (propeller blade spinning at, or very near, leading edge of wing); 2. long tail moment (with tail group constructed to light physical weight). Let length of tail moment depend upon CG location; 3. moderate pylon height; 4. 40 per cent to 50 per cent lifting stab; 5. polyhedral wing (first dihedral break from level—5° and the second or tip dihedral break—15° from first dihedral break).

You will notice that the airfoil ingredients for the hot contest ship listed above is missing. I don't want to start a feud with the flat bottom airfoil lovers who are very prevalent today. Personally, however, I would say that with certain settings a flat bottom wing works well, under power and in the glide, but for top notch glide an under-cambered airfoil with a symmetrical leading edge is hard to beat—and it will go straight upstairs to thermal land. To add to this, the cambered wing can fly with much less incidence and not dive-in in the glide as so many of the flat-bottomed wings.

What has been said here may or may not seem important—it is not important if you are using a sick engine or are flying a big model with a small engine. However, the mass moment of inertia applied only to the fuselage, or longitudinal moment, is enough to whip a good modeler, unless the modeler follows its laws with a short-nose moment, or low mass fuselage moment. This is especially true if the modeler wishes to use hot engines in a moderate size ship that is second to none in climb.

THE END



ENGINE REVIEW

CAMERON .09 MARINE

by E. C. MARTIN

Many problems resulting from inboard installations are solved neatly by unique design features.

As an example of how to construct a small model engine when weight is not of primary importance, the Cameron Marine .09 is outstanding. The basic design specifications provide for continuous running, exceptional life, easy starting, independence from air cooling, high physical strength, protection from over-revving, and high torque at high rpm, so let us, without further discussion, see how these interesting requirements have been met.

An aluminum pressure die casting of the monobloc type, incorporating main bearing, entire cylinder barrel, bypass and exhaust stack, air intake and mountings, is the basis of the engine, with beautifully executed vertical fins, finned crankcase, and a massive main bearing housing to conduct frictionally generated heat away to the radiating portions of the casting.

As in the case of the recently tested Cameron .19, the finish and quality of the castings are first class and no tumbling or polishing has been carried out. While providing adequate cooling where the installation permits sufficient air circulation, the vertical fins also serve the further purpose of conducting heat from the head and cylinder down to the crankcase where it is dissipated by cooling water circulating through the special crankcase backplate. In order that this heat can pass readily from the main casting to the backplate, a special joint gasket of conducting material, rather than the usual insulating paper composition, is used. It is therefore vital that in any installation where water cooling is employed a gasket of the type supplied be used exclusively, and with this in mind a spare is accordingly furnished with the engine, along with an extra head gasket.

A finned die cast head, which is secured by four Phillips head screws to the main casting, is arranged in such a way that there is metal to metal contact over the greater part of the joint area. A composition gasket is used in this case, in the form of a ring which seats only on the upper edge of the drop-in cylinder liner, and actually lies in a recess where the casting stands slightly proud of the liner. The gasket thickness is (*Continued on page 35*)

such that when the head is screwed down tight, the gasket is compressed to exactly the right degree, and since the head is in contact with the main casting, there is no way in which the gsaket can blow, and again excellent heat conducting qualities are permitted through the joint.

This principle of thermally uniting every component is a sound design feature in any engine as it greatly reduces the tendency toward local overheating and consequent distortion and seizure through unequal expansion of carefully alined components. A propensity toward losing power after warming up on the part of some engines can often be attributed to not allowing for this contingency in the design.

In cases where water cooling is not convenient it will be found that the very considerable fin area, in comparison with engines having fins of the circumferential type, will provide adequate cooling with appreciably less air circulation, and after the test runs we found that a six-bladed two-inch diameter fan attached to the outboard face of the flywheel, having a pitch angle of about 20°, provided sufficient draught for continuous running under load without ducting.

The rear of the crankcase extends 1/8 in. behind the cylinder barrel and provides accommodation for a deep hollow backplate, the mouth of which is covered by a further aluminum plate, in much the same manner as a radial tank mount. The two components are secured to the crankcase by three equally spaced tapped lugs and Phillips head screws, with the special metal gasket at the main joint and a paper gasket at the cover joint.

Large inlet and outlet nipples for the cooling water tubes are swaged to the cover and point to the rear. By connecting one nipple to a forward facing 3/16 in. dia. submerged inlet and the other to a rear facing submerged outlet on a boat, it is claimed that sufficient circulation will be provided by the movement of the hull to sustain adequate cooling without any air circulation round the engine. Unfortunately it was not possible to check this feature during test, but by utilizing the workshop plumbing, it was found that the merest trickle from the outlet was sufficient. If the water flow was stopped entirely, however, steam began to emerge within a minute or so, and it would therefore appear advisable to pay close attention to the water inlet design with regard to clogging, etc. If overheating becomes severe, the fuel begins to boil in the spraybar and the engine may stop, but such a condition has no apparent effect upon the engine, as after some eight hours of abuse, the test engine is still as good as new, with perfect compression and sound bearings.

Several interesting features are incorporated in the carburetor, which result in high power production at quite high rpm while causing a sufficient drop in volumetric efficiency at excessive speeds, to limit rpm at no load running and thus avoid accidental damage. A 1/4 in. dia. intake, over one inch long, gives an impression of at least double the true displacement, but in the actual vicinity of the spraybar, which is offset forward of the intake center line, the cross-sectional area is reduced to a figure that is reasonable for an .09.

It is this point, in conjunction with the rotary valve design, that constitutes the safety device, and while it definitely works, opinions as to how it does so may vary. In the first place, the minimum intake cross-sectional area is not by any means small for the displacement, and the intake surface finish and contouring are such as to indicate very high speeds. Also the small Arden engine with almost identical rotary valve port areas was capable of excruciating flywheel rpm, so it seems we have a classic example of the effect of small valve dwell beyond top dead center, as in the Cameron there is only 15° or so before the port

(*Continued on page* 39)

P. G. F. CHINN

FOREIGN NOTES

This monthly world-wide round-up of technical developments, designs, and significant products will report all appropriate news submitted to this department.

By P. G. F. CHINN

Automatic Prop Has 24 Parts

As far as we know, the British-made Elmer variable-pitch propeller is the first automatic variable-pitch, constant-speed, full-feathering prop offered for use on modal airplanes. We have tested this new product (briefly mentioned last month) and it certainly seems to do all that is claimed for it, although whether this means its wide acceptance by modelers is quite another matter.

Designed by Arthur E. Elmer, A.F.R.Ae.S., the prop is the culmination of experiments over the past five years. Its function is the same as for full-size constant-speed props. On take-off and in the climb it stays in fine pitch to allow the motor to develop full power. In level flight or in a dive, when load is reduced, the pitch increases and prevents over-speeding. An additional refinement is the automatic feathering which occurs when the motor cuts.

The pitch movements are controlled by centrifugal force. Blades, which are plastic and replaceable, are mounted on short studs which are locked in a machined aluminum hub but are free to rotate. Bob-weights are mounted on pins attached to the studs so that centrifugal force, in throwing the bob-weights tangentially outward, rotates the blade and coarsens the pitch. The speed at which this occurs is adjustable to various engine outputs by means of a torsion spring, while blade is also adjustable to obtain the basic pitch settings required for specific model/engine combinations.

Feathering results, once the motor is running fast enough for the blades to leave their low pitch setting, when the bob-weights are automatically rotated by their mass being offset relative to the mounting pins. This causes them to miss engaging the fine pitch stop when the power is cut and the blades are therefore rotated by the torsion spring until a further stop arrests them in the feathered position: trailing edges edge-on to the airstream.

The prop is available in one size only, 9 in. diameter, but pitch, of course, is fully adjustable and, taking both FF and CL models into account, the maximum and minimum engine displacements usable are, we would say, in the .09-.19 cu. in. group. The prop is designed to withstand the high centrifugal loadings (165-170 lb.) at speeds of up to 13,000 rpm.

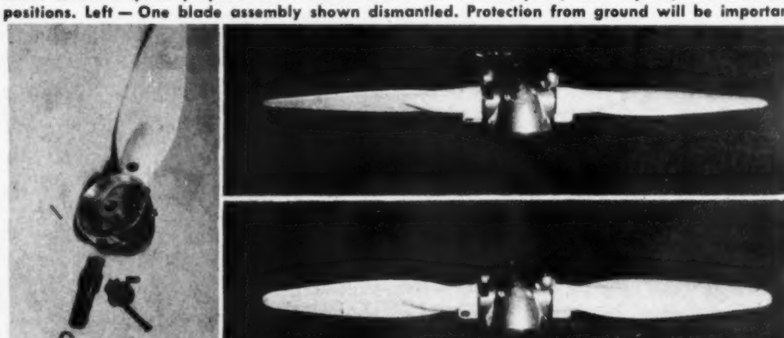
As at present put-out the prop is tapped to thread onto 2 BA shafts (e.g., as on the ED 2.46 Diesel) but there is sufficient material to tap out for larger sizes. With further development there are, perhaps, one or two points of mechanical design which might be improved (such as the method of adjusting spring tension which is somewhat fiddling) and, inevitably, it is heavier than conventional fixed-pitch wood props (just over 2 oz.). However, quite apart from its novelty appeal, a prop of this type has distinct possibilities for stunt and RC and the principle suitably adapted may also offer advantages in team racing, speed and free flight.

The Elmer prop is made by Elmer & Co., 20 Clarence St., Gloucester, England. It costs 18/6d. ($2.59). Including set-screws and pins, there are no less than 24 separate parts in each prop.

Italian Folding Prop

The alternative to a feathering prop is a folder. Not often seen on power jobs, a folder was nevertheless used by third place man Vidossich (Italian Super-Tigre G.20S glow plug motor) at last year's World Power Championships. The Vidossich prop was quite simple, the blades being hinged by nuts and bolts. The hinge-line was at right angles to the shaft and blade axes—i.e., not inclined as

Elmer constant-speed propeller with blades shown in the fine-pitch, coarse pitch, and feathered positions. Left — One blade assembly shown dismantled. Protection from ground will be important.



on rubber model folders—and the blades therefore folded straight back. Though onlookers viewed the contrivance with suspicion, Vidossich claimed a year's flying with no trouble.

New Rule Wakefields Confound Pundits

With the first Wakefield contest yet to be held under the revised rules limiting rubber to 80 grammes, models built to this new specification are already putting up performances higher than many people believed possible. John Gorham, noted British all-rounder, won first 1954 British rubber contest flying such a model—actually a ballasted 1953 model—against old-rule jobs carrying 5-oz. motors. Gorham's 1954 Wakefield will have 14-strand motor giving 50-second motor run on a 22-in. prop. Prop is a folder instead of feathering type formerly used by this builder and is arranged to trip rudder tab to tighten turn and prevent stall caused by rearward center of gravity shift when blades fold. Another well-known British Wakefield designer, Ted Evans, is using a 24-in. folding prop (weight compensated), retracting single-leg landing-gear and a fuselage molded from 1/16 in. sheet.

Jap Tissue from Japan

Mention of Wakefields reminds us that Seiso Tachibana, contest director for the Model Airplane Federation of Japan, makes *real* Japanese tissue. He claims that his is the only genuine colored model tissue made in Japan. His workmen make this stuff by hand, sheet by sheet. He tells us that Frank Zaic (Jasco) is distributing this tissue in the U.S.A. and that Joe Foster is a user, which sounds like a couple of pretty good recommendations.

Belgium Sponsors International RC

RC has yet to be added to the list of events which comprise the World Championships series, but a big step toward its recognition has obviously been made in the presentation of a perpetual trophy for RC competition by King Baudouin of Belgium. The first contest was held last September at Evere Airfield, Brussels, without attracting over-much attention from the rest of the world, yet it was well attended by teams from Belgium, France, Germany, Great Britain and Holland and the standard of flying was high, with outstanding performances from the Gobeaux brothers of Belgium (the eventual winners), French expert Albert Wastable (second) and German newcomer K. Stegmaier (third). All three were using multi-channel tone equipment which (excepting Gobeaux) included motor control.

Aerotrol Abroad

Unlike American motors, which, despite all sorts of import restrictions in foreign countries, find their way all over the world, American RC gear is not widely known outside the U.S. This is because, compared with U.S. engine prices, most American RC equipment is expensive. One exception is the Aerotrol, which foreign users have rated highly. Forerunner of the thyratron-tube receiver, it was never equalled, in our opinion, by any of the British gas-tube sets which followed it. We have had three Aerotrols, including one Super-Aerotrol and another built from a kit. They have proved absolutely reliable.

New Czechoslovakian Motor

Czech speed expert Josef Sladky has come up with new .29 cu. in. Letmo glow plug racing motor. Somewhat resembling Dooling .29 in appearance, motor has .787 in. bore and .610 in. stroke. Weight is 7.4 oz. Motor uses sandcast crankcase/cylinder-block and has usual disc valve and twin ball-bearing shaft. Head has offset plug, is without fins and is held by six screws. Rated power is given as 0.45 hp, which, having regard to general design and to capabilities of previous Letmo motors, is, we would say, a conservative claim.

Rubber-Powered Indoor T/R

Something to satisfy energetic junior club members on winter (*Continued on page 50*)

FLASH NEWS

Lightweight fighters to supersonic bang warfare, the aviation news gets wilder and woolier.

By ROBERT McLARREN

▸ Revelation of the Navy's two "terror twins," the Lockheed XFV-1 and Convair XFY-1 VTO (vertical take-off) fighters, proves that the future inevitably arrives. Readers' sketches of "dream" designs through the years have repeatedly foreseen the shape of such planes-to-come and these fantastic twins are now a reality. The Lockheed design features a straight wing, while the Convair uses the delta configuration, reflecting these well-known company design philosophies. Both use cruciform tail surfaces with castoring wheels as a "landing gear" for their vertical take-offs and landings. Both are powered by 5,500-hp Allison T40 turboprop engines, which produce about 12,000 lb. of thrust for take-off. So long as the airplanes weigh less than six tons, they can rise vertically. The less they weigh ready for take-off, the more rapid their vertical acceleration (and the safer the pilot!).

In our report last month, we explained they are not convertiplanes, since nothing about them "converts" in mid-air (such as rotor shafts moving through an arc, or folding away, etc.). The Navy has sponsored both the planes because of its interest in developing such a weapon for operation from a cruiser or tanker. Success of the two new planes doesn't mean the death knell for the offensive role as a bomber and assault support ship, rather than as a defensive ship for a fleet.

Air Force, which is sponsoring development of the Ryan model 69 and a Bell VTO experimental type, will use turbojet power for the job, a much more difficult design problem. They will have available only the static thrust of the engine, which means they will have to have 12,000-lb. thrust jet engines if the airplanes are the same size and weight as the Navy's pair. Fuel requirements for the jet engines will be so much higher, however, that a much larger airplane seems obvious and this probably means twin-jet installations in both types.

Meanwhile, Lockheed has successfully flown its XF-104 superiority fighter, which is conventional by comparison with its XFV-1 but quite unconventional in that it is the first of the long-awaited lightweight designs. It features a thin, straight wing and is powered by a Wright J65 turbojet engine of 7,200 lb. static thrust. Although no data has been released, the new design probably weighs less than 10,000 lb. fully loaded, compared with the 15-20,000 lb. of climb through to its light weight and has supersonic top speed, just about everything desirable in its type.

Convair, too, continues its rivalry in the news with Lockheed, by revealing its YF-102 delta-wing fighter, production on which is already under way. Although based on the well-known XF-92A, world's first delta-wing fighter, the new YF-102 is an advanced design featuring a "solid" nose for radar and side air inlets for the big Pratt & Whitney J57 turbojet engine which, with afterburner on, delivers an incredible 15,000 lb. of thrust. Supersonic top speed, of course.

Air Force now has 15 Strategic Air Command wings of Boeing B-47 *Stratojet* bombers in active service. Since production began in 1948, Boeing, Douglas and Lockheed have built more than 600 of the swept-wing six-jet bombers. They have been used to replace Boeing B-29 and Boeing B-50 bombers in SAC units, as well as to form new wings. However, such jet bomber wings are not all-jet units for each of them contains a Refueling Squadron equipped with Boeing KC-97 aerial tankers. With the big Boeing B-52 eight-jet bombers on the way, our Strategic Air Command is fast becoming an all-Boeing force, as the Convair B-36's are gradually replaced.

U.S. Army is moving full-speed ahead on its integration of the helicopter as its basic aerial tool. It has announced orders for 272 helicopters to be supplied to National Guard units throughout the country, 88 of them within the next 12 months. The craft will be used to train Guard units in photography, air ambulance service and liaison work and will also make helicopters available for local disaster service. East Coast National Guard units will receive Bell H-13 machines while Central and West Coast Guard units will get Hiller H-23 craft. When called into active service, these National Guard units will be experienced helicopter units ready for combat.

Utility aircraft, the new term for "personal" and "private" planes, continue their strong comeback in production, after an uninterrupted downhill slide in the postwar years (which saw production drop from 50,000 in 1946 to 2,000 in 1951). Official figures are now available for total production during 1953 and they reveal a total of 3,788 utility aircraft built during the year (compared with 3,058 in 1952). While the strong shift to twin-engine executive types continued, the good ol' Piper Tri-Pacer led the pack with 1,139 delivered, followed by 700 Super Cubs, 663 Cessna 170's and 644 Cessna 180's, the leaders in that order.

Thunderflash is the new name for the Republic RF-84F swept-wing photo-reconnaissance fighter, companion to the F-84F *Thunderstreak* fighter. First production deliveries on the new single-seat photo plane have begun. The recon version differs from the fighter in the use of side air inlets for the Wright J65 turbojet engine in order to permit installation of cameras, radar and detection equipment in the extended nose. The RF-84F will be carried to the vicinity of its target in the belly of a Convair B-36 bomber, released and retrieved after its mission for the flight home. Since the B-36 has a range of 10,000 miles and the RF-84F an additional 2,000 miles, the USAF can now photograph virtually any place on earth from a U.S. base by landing at a foreign, friendly base.

Skywarrior is the new name for the Douglas A3D-1 twin-jet Navy carrier bomber. Although the prototype XD3D-1 was powered by two Westinghouse J40 turbojet engines, the production A3D-1's are powered by two Pratt & Whitney J57 turbojet engines. The new name also applies to the RB-66A Air Force version of the same plane, which is powered by two Allison J71 turbojet engines.

(*Continued on page* 53)

Engine Review

(*Continued from page* 35)

is completely closed. The result is that the engine has difficulty in sucking sufficient air through the intake at abnormal speeds, and momentum gained from the high velocity at which the air travels past the spraybar is prevented from having much effect by the early closing valve port, and, consequently, excessive rpm is not attainable.

The spraybar is interesting in that the delivery side is counterbored to an unusually large diameter up to the metering jet. This allows free fuel flow, and owing to the relatively large volume of fuel at the jet, better convection and less tendency to boil and develop vapor locks. The accurately fitting tapered needle and stepped spraybar bore provide a positive fuel shut-off to prevent flooding when gravity feed is used, and also assures vibration-proof location of the needle point and consistent mixture strength at all speeds. A thimble type frictioning device with split internal thread also stabilizes the needle point in every direction, and is particularly suited to the superfine adjustments possible with constant flywheel load and fuel pressure usually obtaining in marine operation. A knurled aluminum control knob is fitted at the end of a 1 in. rigid extension.

As already mentioned, a very large main bearing housing is employed which provides 1/8 in. thickness of metal around the bushing. A 1/4 in. dia. crankshaft is used, and the bushing has an outside diameter of 1/2 in., which adds up to a considerable volume of metal and excellent rigidity and heat dissipation. The bushing is made of sintered iron, and is a standard industrial size, being a press fit in the housing. The advantage of the sintered metal powder process is that the end product is porous and therefore absorbs oil and can provide its own lubrication for very long periods. In a model engine this porosity allows oil to creep from the intake, the source of oil, to the outer end of the bearing where lubrication is otherwise often inadequate unless a sloppy fit is used. A satisfactory supply of oil to the outer bearing is therefore maintained in spite of close bearing fits, and crankcase pressure leakage is minimized. Owing to the efficient metering property of the porous iron, less excess oil is thrown out to contaminate the model structure, which reduces one of the prime sources of annoyance to model boat fans.

The cylinder barrel is accurately bored to a very good finish to receive the drop-in liner, and is reduced in diameter at the bottom to provide a lower locating shoulder. The liner is also stepped to produce a 1/8 in. long projection into the smaller barrel diameter. The projection is slotted to engage over a key in the barrel which locates the liner in correct radial position for port alinement. The cylinder head thus completes a sandwich arrangement which imposes all liner stress in an axial direction and avoids distorting stresses.

A very wide and nicely shaped 170° exhaust stack projects from the left side of the cylinder with a machined bypass passage opposite, which coincides exactly with the liner ports.

With a bore of 1/2 in. and an outside diameter of 11/16 in., the liner itself has a massive wall thickness (which is ground inside and out to a high finish) and distortion of any sort is extremely unlikely. The exhaust opening of 3/32 in. is not conducive to very high rpm, and probably contributes to the safety feature, however the circumferential port length is close to the maximum possible, which means that the port area is large and efficient for moderate speeds, but by virtue of the timing will cause a rapid drop beyond the power curve peak. Bypass design is similar, with a long port and narrow opening, but still designed to be very efficient up to the

(*Continued on page* 42)

NEW!

PITT'S SPECIAL

LITTLE STINKER

SCOOP! Here's Betty Skelton's championship stunt flyer . . . never before at this low, low price. It's one of the snappiest, most colorful stunt flyers that ever took to the air. The completely prefabricated kit features: carved balsa fuselage, all the colorful decals, formd balsa wing, plastic pilot, Jim Walker's U-Control, etc., etc. — everything cut, formed or shaped for easy assembly. 2.50

POWER WITH ANY SMALL BORE ENGINE (.020 TO .074)

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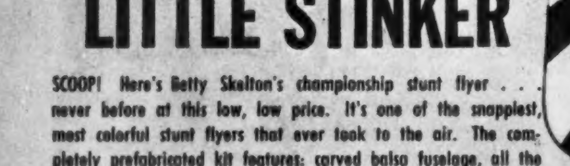

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18" WINGSPAN FOR .020 TO .074 ENGINES

Here's our new, popular U-Control trainer . . . the biggest dollar's worth of model airplane in the whole wide world. It's a 100% complete — 100% prefabbed. BEGINNERS . . . Assemble it in "nothing flat," add your engine — and away you go! EXPERTS . . . you'll love this inexpensive profile job for your experimental work — for testing new flying techniques. 1.00

NORTH AMERICAN

TEXAN AT6

18" WINGSPAN FOR .035 TO .074 ENGINES

An AIR TRAILS "Blue Ribbon" award model. It's our authentic scale replica of the world famous U. S. Air Force AT6 Trainer. The Navy calls it their "SNJ". Modelers everywhere call this exciting control-liner a real "thriller." The completely prefabricated kit includes: Jim Walker's U-Control, carved balsa fuselage, formed wing, cowling, etc. 1.95

FREE Scientific Catalog . . . Contains all our exciting action models: Airplanes, Speedboats, Race Cars, Etc.

BOEING F4B-4 $2.95
SPAN: 17 ½" For .020 to .074 Eng. Deluxe U-Control model. 100% complete—100% prefabbed . . . with carved balsa fuselage, metal cowl, rubber wheels, pilot, etc.

LITTLE MERCURY $1.50
SPAN: 18" For .039 to .074 Eng. Carved fuselage model — at this sensational low price. It's completely prefabbed . . . easy to assemble, easy to fly. Jim Walker's U-Control.

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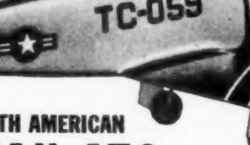
SPAN: 17½" For .020 to .074 Eng. Deluxe U-Control model of the U.S. Army's famous "Hawk" fighter. 100% complete . . . 100% prefabbed. Contains carved balsa fuselage, etc., etc.



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For .020 to .049 Engines
Imagine! This carved fuselage biplane "beauty" for only $1.50. It's semi-scale. Features Jim Walker's U-Control, all prefabricated parts.

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SPAN: 18" For .020 to .074
Famous escort fighter model. pletely prefabbed. Features balsa fuselage, formed balsa etc., etc.

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18" For .020 to .074 Eng. ...mically priced U-Control ... Easy to build and fun to ... Prefabbed parts include: balsa fuselage & wing, etc.

BUCKEYE JR. $3.95
LENGTH: 14" For .020 to .074 Eng. Full speed ahead for thrills with this "beaut" of a speedboat. Prefabbed model is 100% complete—carved balsa hull, brass fittings.

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For "½ A" Eng., Electric Motors Authentic Chris-Craft replica with a 12" carved balsa hull and brass metal fittings. All parts finished. Completely prefabbed model.

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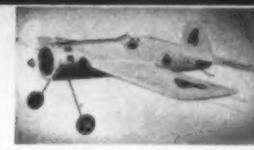
"½ A" Eng., CO_2, or Elec. Motors Features our exclusive aeronautical fin and rudder design. Prefabbed model has a 12" carved balsa hull, brass metal fittings, etc.



BEL AIR $2.95
SPAN: 18" For .039 to .099 Eng. Deluxe speed, sport & stunt flyer. Features carved balsa fuselage, formed hollow balsa wing, etc., etc. — all satin smooth finished. U-Control.

NEW!

NORTH AMERICAN F-82 TWIN MUSTANG

18" WINGSPAN FOR .035 TO .074 ENGINES

The fabulous F-82 . . . first time as a control-line, fly-it-yourself model. Powers with 1 or 2 engines. TEST FLIGHTS PROVE THIS! It's super-prefabricated with 2 carved balsa fuselages, airfoil wing, 2 canopies and pilots, 2 metal cowlings, 2 landing gears, etc.

$2.95

BOEING P-26A

18" WINGSPAN FOR .020 TO .074 ENGINES

Our popular P-26A . . . in honor of the U.S.A.F.'s first all metal pursuit plane. This highly colorful model brings to life all the beauty of the prototype. It's a terrific control-line stunt or sport flyer. The super-smooth prefab kit contains a carved balsa fuselage, formed metal drag ring, etc., etc.

2.95

Mr. Stanley Ziemba, Jewett City, Conn., sent us this photo of his Scientific P-26A. Stan says: ". . . It's a beaut and flies like a dream."

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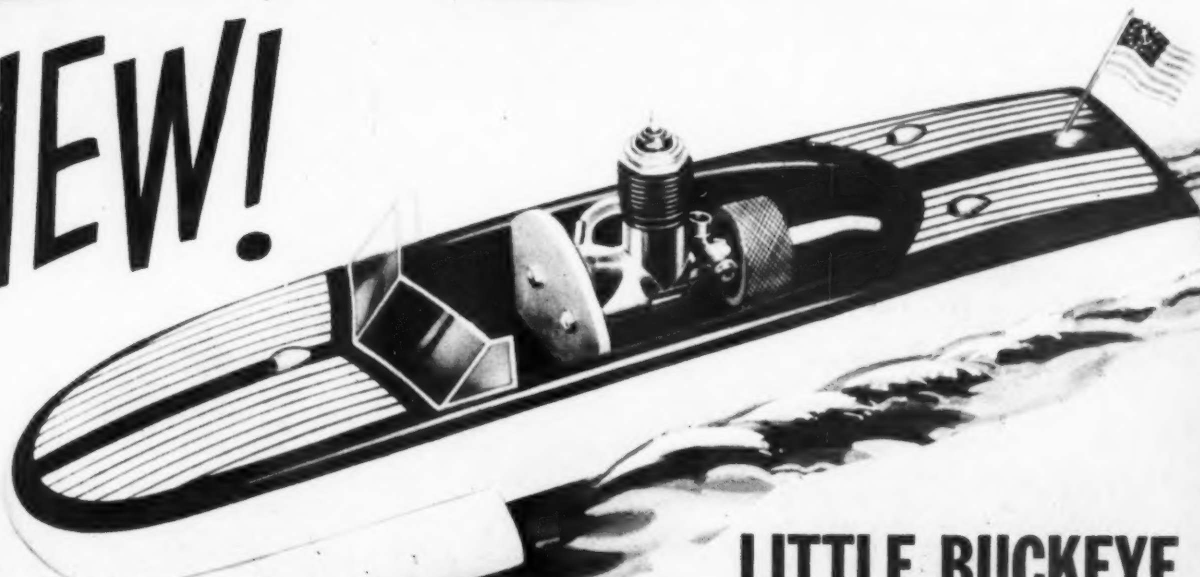

LITTLE BUCKEYE

You're in store for exciting action with this sleek speedboat. It's prefabbed for super-easy assembly. Just wait till you see it in action . . . it's positively sensational! Power it with any "½ A" engine, electric motor or Jetex. The big-value kit features a fully carved balsa hull, brass metal fittings, etc., etc.

1.95

maximum intended speed.

With such a high degree of rigidity and heat control, the use of exceptionally fine working clearances is possible and desirable, as working life and low speed efficiency and behavior will be improved. As a result, the fits and finishes of the important surfaces in this engine are virtually unique, and it was not surprising that at the conclusion of the tests, the engine still seemed brand new. The honed cylinder bore is mirror-like, as is the fitted portion of the piston. The main bearing and crank and wrist pin clearances also have fits and finishes of a very high order.

The piston details include, as might be expected, a very high baffle to exert the maximum directional influence on slow moving gases when running under heavy load. Actually the curved fence arrangement on the Cameron is higher than the baffles of many .29 engines, and regular two-cycle firing is obtained down to exceptionally low speeds as a result. Machined from steel bar, and hardened, the general design is conventional in most respects, having an increased skirt thickness for wrist pin support, and bearings located at the mid-skirt length for a 1/8 in. diameter hardened and ground solid pin. Thin brass end pads locate in the bearings at either end for cylinder wall protection.

The fitted portion of the skirt extends for two-fifths of the skirt length and the balance is relieved quarter of one thousandths of an inch, which allows efficient guiding influence without rock.

A method of conrod production is employed which, for some reason, is unusual, although it is economical and excellent in almost every respect. A punching with pierced holes from 1/8 in. aluminum alloy sheet has the bearings reamed at each end, and that is the conrod. Its properties are similar to those of a drop forging.

The crankshaft is notable mainly for an extremely heavy disc which almost deserves the title of flywheel. The 1/8 in. dia. crankpin is hardened and then pressed into a suitable hole in the disc, which allows the use of a soft shaft. Small flats are milled on the disc periphery at either side of the pin to balance the assembly and a thin aluminum spacing washer is interposed between disc and rod to insure shank clearance. A shallow locking taper at the outer end of the shaft receives the flywheel which is retained by a screw engaging in the tapped shaft. A steel shim is placed between flywheel and bearing face to deal with thrust, which is, of course, in either direction on this engine.

The flywheel is machined from steel and features a starting cord pulley and knurled periphery. At the outer end, a slotted recess is provided for a pin-and-ball type universal drive, and the whole component has an attractive blued finish.

To assist smooth running and minimize the effect of any out-of-balance forces in the final drive gear, the flywheel extends back over the main bearing housing, and is therefore mounted to the shaft taper at its approximate center of gravity.

The cylinder head has a combustion chamber shape similar to most racing engines, designed to promote smooth scavenging and turbulent charging. A short reach plug is supplied with the engine, but the plug threads are made long enough for a long reach type.

It will be evident from the foregoing that this engine is a natural for tuning experiments. It is rugged enough to show benefits from very high compression ratios and hot plugs, and since increased cylinder pressures are the direct result of such factors, greater torque will be produced, which should be of interest to the boat fan with a flair for engines.

Giving airplane prop performance figures for the Cameron would be an unfair comparison and of no particular help for marine purposes.

THE END

MAN at Work

(Continued from page 6)

Chuck Tracy, Aviation Editor of the Cleveland Press, blows both hot and cold on the idea: "I'm glad you ran that dope on 'Should We Scrap Microfilm?' I'll go along with Roth that indoor flying, everywhere but in Cleveland, needs a shot in the arm. We've pretty much ignored national rules and categories to set up the events most popular with the kids. For years, we've always separated paper-covered from microfilm-covered. But I completely disagree with Roth that microfilm should be scrapped! That's silly in this day of pre-fab kits when originality and ingenuity are all but lost. I say let's keep the few remaining fields where real work still is rewarded, like the Wakefield and indoor microfilm. The brand of guys who carry on in this stuff are the end result of the entire modeling program. But Roth gets a little too 'long hair' with his formula and chart. He's too far from the kid in the street.

"Seeing the figures on entrants in national indoor events makes me feel good. We pulled nearly 400 individual entrants with an average of three planes apiece in our January meet here. We had microfilm, too, and lots of it. I think it's important, too, because sponsors and 'layfolk' are always tremendously impressed by the models covered with mike, which is a big help in getting the cash to run the contest.

"Other cities have fallen behind in indoor meets simply because model leaders haven't rolled up their sleeves and done a convincing selling job on civic leaders in recreation, YMCA's, schools, Chambers of Commerce, Air Force Assn.'s, and other possible agencies which can make suitable places to fly available. There's nothing hard about selling model aviation. It's the nation's No. 1 hobby; it's a great hobby and sport for kids in a day when delinquency is rising. All they have to do is talk turkey to the right people and put the pressure on if they don't get the right answers.

"Of course, we don't want to be out-of-step with the nation and running the only indoor meet. That's no fun because there's no competition. Besides, the supply problem gets tough and is now. We fly in two places, one with 90-ft. ceiling, the other about 60. We've never cracked any mike records; our best is 12 minutes. But we set a new HL glider mark occasionally. I'd say simply that AMA should poll the modern time indoor fliers and make some sensible revisions in the rules, maybe create a couple of new classes copied a little after our pre-fab event which is ideal for beginners and still interesting for opens."

The city of Cleveland, the Cleveland Press, and other local groups have an astounding

success with their model contests. The Seventh Annual Model Plane Exhibit Contest held on Washington's birthday drew 1,519 models and 30,000 spectators. Radio, TV and newspapers did it up brown.

• • •

▸ Dull thuds and earth tremors to the contrary, the flying scale boys who do not see eye to eye on the rules discussion by Rules Committee Member Bob Hatschek in the April issue are really quite gentlemanly about it. They keep their blows up. Well-known scale modeler Walt Mooney is one who likes the new deal.

"Have just read MAN at Work in April issue and can no longer refrain from making known some of my ideas on the subject," Walt tees off. "I say 'hats off' to the scale rules committee and to Mr. Hatschek for putting it straight to these chronic complainers. The rules may not be perfect but I have yet to see a model win under them that should not have won under any rules.

"The Convair Aeromodelers held a sanctioned scale FF contest on the 28th of February in which, as usual, Louis Culler and his Berkeley Super Cruiser walked or flew off with top honors. We had 16 entries for the scale judging the night before but there were about 25 at the field. It seems that quite a few scale modelers have more than one model. It would seem to me that a modeler should be able to enter more than one model but take a prize only with one of them. This change alone would have given us five more entries and would have given the spectators a better show.

"Aside from the rule I mention above, I see no change necessary. A scale builder under the rules can build a flying ship or a super detailed ship but as in many other events it is probably better to compromise a little. In my last scale job the cockpit details, dummy engine, flying wires, etc., added only half an ounce which just brought the plane up to weight. As far as dope and wheels go, even the pylon boys have them. Dihedral is the only rough point and the rule looks good to me the way it is.

"I agree that most of the flying scale designs are too small. It is my opinion that the model should have a very high power loading and a very light wingloading. We in America have a problem here. I have found no American Half-A glow plug motor capable of performing well with an 8-in. dia, prop. Most of them run best with a 5 or 5-1/2 dia. prop. When you consider that 1 in. to the foot scale DeHavilland Beaver has a NACA cowl about 4-1/2 in. in diameter, it becomes apparent that a long stroke high torque engine is required. The Mills .75 cc. fits the bill fairly well.

"As for the argument about engine size, the model size problem is the same. If you build a ship to fit the prop, so to speak, you are bound to have a small plane as far as power is concerned. The other course left open is for the modelers to develop some good scale jobs for the engines which are available. This is being done."

Disagreeing is Chuck Wood, president of Seattle Skyhawks and chairman of Greater Seattle Model Council, who renews the fray: "Appreciated your run-down of both Hatschek and my opinions. It was fairly done. All of this is good as it stirs up interest in flying scale and the AMA. At our club meeting, it resulted in a "run" on MAN and the shop sold out.

"The ratio system works like so: say a scale P-51 scores 100 points (maximum) on scale appearance and then is hand-launched (or ROG's) for a 60-second flight, 30 seconds of which is engine run and 30 seconds is glide. (This would be darned good for a P-51 type, too.) On this flight, by dividing the total flight time (60 sec.) by the engine run (30 sec.), we arrive at a ratio of 2. Taking the ratio of 2 and multiplying the

scale points (100) we arrive at 200 which is the total score for the P-51. The next fellow up has a Piper Cub that has greatly increased tail area and dihedral and is poorly detailed so he only gets 50 scale points, which is fair enough. But—he gets a total flight of 3 minutes (or 180 seconds) with a 30-second engine run. Again by dividing 30 ÷ 180 = 6 *ratio* x 50 scale points equals 300 total score. So he wins, although both models have had good flights and the Piper Cub is only half as good from a scale standpoint as the P-51. Now, then, is this fair? First of all, I'd be tempted to give the guy with the P-51 a medal for just having the nerve to fly the thing.

"Actually the fault of a ratio-multiplication system lies in the fact that the scale points are fixed (you can't get more than 100 points no matter how good the model is), yet the flight of the model is judged by an ascending scale of ratios, depending on just *how long* the model does fly. In reality, it's an *endurance contest* for scale models. The ratio system in England and on the Continent is used to score endurance types, not scale models.

"We of the Greater Seattle Model Council are not plugging for flying-shelf-type models, nor are we plugging for more scale points. But we do want to see scale models judged on their ability to fly smoothly and consistently regardless of their *endurance* capabilities. This is why we have been urging a pattern system of scoring as we see in AMA RC and stunt patterns. If we use a pattern system (take-off, climb, glide, landing) then types like P-51's and biplanes and high wing types can compete on an equal basis." END

Penny

(Continued from page 26)

cockpit. Should any difficulty be encountered in shaping the stringers, use steaming water and bend to shape. A similar technique is employed when planking the hull. All bulkheads are 1/8 in. medium sheet balsa. The transom is 3/8 in. stock.

When framing is completed and ready for covering, brush several coats of clear dope to all areas. Hull sides are first to be secured, followed with the bottom then the deck. When completely dried, cut away the cockpit areas. Cockpit sides are then added using 1/16 in. sheet balsa, followed with a 1/8 in. balsa floor.

The coamed surfaces (cabin sides) are shaped from 1/8 in. sheet balsa. They are cemented in place at the angles given in the drawing. The windshield is next fastened. Sand smoothly all window openings and break all sharp corners. With successive sandings, brush over all areas previously touched. At all times, keep firm sound joints in mind. A leak can very well cost us a boat. Adding the cockpit roof completes the last of the balsa work.

Since our boat is not of the flying type, we can be liberal with its weight. First, brush on several coats of clear dope, sanding lightly with each application. Follow the doping with several brushings of Balsa Sanding Sealer. Be sure to apply the sealer against all grain. Should there be any pin holes still present, fill these with a good grade wood filler. Using fine grain sand paper, bring all surfaces to a smooth satin finish.

The color scheme can be almost any the modeler prefers. Our choice was a white hull, with blue bottom and red water line. The cabin sides and cockpit are a chocolate brown with white roof. To simulate canvas, we finished the deck in a willow green.

For power, as was mentioned previously, we employed an electric outboard, powered with two 1-1/2 volt batteries mounted in the floor of the cockpit. The motor has a built in reversing switch; this simplifies the wiring arrangement. END

All About JETEX

(*Continued from page 11*)

clip of spring-steel wire. A subsequent development of this, for larger motors, was to add a roller and leaf-spring and this type of clip is standardized on the Jetmaster and Scorpion (the latter using twin clips), which greatly speeds up reloading operations, compared with the older type.

With more recent design developments have come improved fuels. The Jetex motor was, of course, only made possible by the advent of the unique solid fuel, developed by the huge Imperial Chemical Industries concern at their Explosives Division factory in Ayrshire, Scotland, and which is exclusive to Jetex. More recently, a slightly faster burning compound, giving greater power, has been developed. Known as Red Spot fuel, this can be distinguished by its red color, as opposed to the yellow tint of the standard fuel pellets.

Coincident with these fuel developments came the augmenter tube. The augmenter tube was originally introduced for use with the Jetmaster unit and, on this motor, the tube does "augment" quite appreciably, there being an increase in thrust of around 25-30 per cent when it is properly used. On the other hand, an augmenter tube does not have such a noticeable effect on other motors in the range. The greater efficiency of the Jetmaster augmenter tube set-up can, no doubt, be attributed to the smoother and less restricted entry provided by the extended nozzle of the Jetmaster unit itself.

Quite apart from their possible employment as a means of improving performance, however, the augmenter tubes have very real uses in scale type installations. No longer is it necessary to mount Jetex units externally, or in channels in the bottoms of fuselages. Moreover, it can be located in the best position, close to the center of gravity, where changes in weight, from the combustion and dispersal of the fuel, will have a negligible effect on trim.

The augmenter tubes are made of thin gauge aluminum alloy and, since the thrust is continuous, tube length is not critical to any pulse frequency and may, therefore, be shortened or lengthened, within moderate limits, to conform to scale requirements. Tubes of 1-in. tailpipe diameter and 6 or 13-in. over-all length are supplied for use, respectively, with the Scorpion and Jetmaster, although either tube may be used with either motor. Generally, the shorter tube is found to give the slightly better performance. For the 50B unit, the tube is in three sections, consisting of a bellmouth entry section and two 5/8-in. dia. tailpipe components, giving an over-all length of 4 or 6 in.

When the Jetex unit is built into the fuselage, it is usual to make the augmenter tube an integral part of the structure. In fact, the tube itself can be used as a basis for the aft section of the fuselage. To do this it is only necessary to cut holes in the rear formers to fit the outside diameter of the tube, to position them at their respective stations along the length of the tube and then to add stringers or planking.

Some idea of the unique types of models which modern applications of Jetex makes possible is seen in several new models designed by Bert Judge, the first two of which, true scale models of the Hawker Hunter and Supermarine Swift jet fighters, have now been kitted. These ships are designed primarily for the Jetmaster (with, of course, augmenter tube) and have won high praise from expert modelers, being authentic, well-performing and ingeniously designed. The kits, incidentally, are semi-prefabricated and the fuselage outer skin is molded in two half shells from very thin sheet balsa reinforced with tissue on the inside.

Apart from factory research, various people have experimented with Jetex derivations. The first augmenter tubes were, in fact, evolved by the LSARA (Low Speed Aerodynamics Research Assn.), a body of technically minded enthusiasts whose activities have embraced many aspects of model design. Another development has been a Jetex turboprop unit in which Jetex thrust is converted into rotary mechanical energy via a miniature turbine.

One of the problems which has bothered experimenters for some time has been the question of twin-motor layouts. When Jetex was first introduced, it was thought that satisfactory twin-motor models would be much easier to produce than equivalent prop driven models, but this has proved to be far from the case. Quite apart from the fact that even exceedingly minute variations in jet diameter between one motor and another produce quite considerable variations in thrust, there can be an appreciable difference in thrust because of inconsistencies in the fuel pellets. This is, perhaps, a little surprising at first sight since the fuel compound must obviously be prepared in quite large batches, but it is, nevertheless, a fact, and not even the choosing of apparently identical fuel pellets from the same box is any guarantee that they will burn equally.

The solution to this problem would appear to lie in the linking of two motors in some way so that internal pressures are balanced out. This is the method which the makers are currently pursuing as a means of achieving differential thrust compensation for twin-engine layouts. At this writing, no definite design has yet been evolved but it is hoped to have a practical system, suitable for production, worked out shortly.

The most popular Jetex motor in the U.S.A. has been the Export 50 unit, which has now been evolved into the 50B. The export model 50 and the 50B differ from the

original standard 50 as sold in Britain in that they have presold cases instead of a machined one. The 50 has now been suspended from production in favor of the 50B.

Although, at first glance, the various units may appear to be the same inside, there are a number of differences. The smallest unit, the Atom 35, has, for example, a cone shaped washer in the end of the case ("bottom shield," as it is called) and the fuel pellet is specially recessed to fit this. The purpose of this is to reduce the thrust toward the end of the power run, in order to obtain a smoother transition from power flight to glide. The 50 model, on the other hand, has a plain pellet with flat ends and a flat base washer. In contrast, the big Scorpion has the *front* face of the fuel pellet coned, the gauze disc being coned to fit, and the purpose here is to enlarge the burning area and thus increase thrust. There are differences, too, in the composition of the fuel pellets themselves. In order to maintain similar durations between the various units, the composition of the larger pellets is such that they burn at a faster rate than the pellets which are of lesser volume.

Failure to start with a Jetex comes, almost without exception, from carelessness. In such cases, the igniter wick fails to fire the charge, either because the wick is not being properly pressed into contact with the pellet when loading, or because the pellets have been allowed to get damp.

The igniter wick is a special highly inflammable plastic compound with a copper wire core. The wire has two functions. First, it gives the necessary physical strength to the wick to enable it to be handled without breaking and, secondly, being an exceptionally good heat conductor, it passes on the heat necessary to insure that the fuse is not snuffed out when passing through the jet.

Normally, this wire core is quickly burnt through and expelled from the jet upon ignition of the charge, but, to make doubly sure that partial blockage of the jet does not occur, a new method of fusing the charge is now being adopted and has the approval of the manufacturers. In this, the free end of the wick, instead of being led out through the jet orifice, is coiled down on top of the gauze (as well as underneath it, of course) and a short, separate length of wick is then inserted through the jet to make contact with this. The gauze disc, it should be mentioned, also has an extra function, which is to prevent any solid particles of the products of combustion from becoming lodged in the jet.

Earlier we mentioned servicing. With a Jetex motor, this boils down to keeping the unit clean—but really clean! Also, the sealing washers used in the motors must be renewed when necessary since any escape of gas, if allowed to go unchecked, is likely to pit and burn the metal casing of the motor and eventually render it useless. Briefly, Jetex maintenance can be summarized as follows.

New motors: There is a tendency, especially when new, for the rubber, in the graphited asbestos sealing washers, to vulcanize itself to the metal case. The cap and case should not, therefore, be abruptly pulled apart after releasing the retaining clips or the washer may be torn or otherwise damaged. Instead, the cap and case should be held in contact and rotated against one another (see Photo A.) This will insure a good seating for the edge of the case and, if always practiced, will extend the life of the sealing washers. Note that in some motors (notably the Jetmaster) a thin, plain white asbestos washer is fitted to the motor as supplied. This is used only until the parts have become bedded in with use (i.e., during the first few firings) after which it is replaced by one of the thick graphited asbestos washers supplied with the outfit.

Proper sealing of the end cap is most important. Inspect the cap and body edges frequently for possible leakage and tell-tale carbon deposits (Photo B.) If black marks are found, clean the edges of the metal before reloading (Photo C.) If the black marks reappear after firing, fit a new cap washer. With care, cap washers will last 20 firings.

Jet: The jet must be kept clean. Jetex outfits are now supplied with a reamer or wire for jet cleaning and with the new fuels and high performance motors like the Jetmaster and Scorpion it is essential to clean the jet after every flight.

Case deposit: Combustion of the fuel charge results in a fairly heavy solid deposit on the interior of the case. It is not necessary to clean this down to the bare metal, but it should not be neglected and allowed to build up as the fuel pellets are a fairly close fit in the body and an excess of deposit may cause a pellet to jam when being inserted, following which the only course is to drill and cut out the pellet. When cleaning out deposit, avoid damage by using a wood scraper rather than a metal one.

Washing: At fairly frequent intervals, such as when a new cap washer is fitted, or, better still, after every flying session, the motor should be thoroughly cleaned. This will entail dismantling as far as the construction of the particular unit permits (motors with detachable jets should, for example, have jets removed) and immersing in hot water and then scrubbing each part with soap or a detergent. Ferrous parts, such as the jet, can be lightly oiled during reassembly.

Model dimensions and weights for the various Jetex motors depend a good deal, of course, on the type of model and on the sort of performance desired. However, in conclusion, we can summarize this:

Scorpion: Maximum all-up model weight: 12 oz., or 14-16 oz. if augmenter tube is used. Wingspan: 30 to 45 in. For duration contest work, weight figures should be halved, using up to 200 sq. in. wing area.

Model 350: Maximum weight: 10 oz. or slightly more if long cruising power flight using two or three fuel charges is aimed at. Wingspan: 30 to 42 in.

Model 200: Maximum weight: 6-8 oz., the higher figure being permitted if long cruising flight using a double fuel charge is intended. Wingspan: 24 to 36 in.

Jetmaster 150: Maximum weight: 4-6 oz., the upper limit for models equipped with augmenter tube. Wingspan: 20 to 30 in.

Model 100: Maximum weight: 3-4 oz. Wingspan: 18 to 25 in.

Model 50 & 50B: Weight: 1-2 oz., higher figure with augmenter tube. Wingspan: 12 to 18 in.

Atom 35: Weight approx. 1 oz. Span 12 in.

END

Gold Dust . . .

(*Continued from page 23*)

dihedral by using 1/8 in. thick hard sheet balsa gussets blocked up to the dimensions shown on the plans. After the leading edges and tips have been shaped to conform to the airfoil, sand the wing throughly.

The stabilizer ribs are cut to shape before they are pinned to the plans. The spar should be tapered to the dimensions shown before assembly. The stab too should be recemented and thoroughly sanded.

The rudder is cut from medium 1/8 in. thick sheet balsa. The sub-rudders are cut from 1/16 in. thick plywood and are cemented into the slots provided in the stab after covering.

If it is possible the entire ship should be covered with silk. Silk adds plenty of strength to your ship at a very slight increase of weight. It is very easy to cover with. Use six or eight coats of clear dope, color trim and fuelproofer.

END

DIRECTORY FOR HOBBY DEALERS

It Pays to be Original

(Continued from page 17)

-6° to -8° with respect to the main supporting surface.

After many flights made with a profile canard U-control model, we feel the canard can be exploited to advantage in every phase of controlline flying. Our own experience indicated factors to be considered. Control response, although good, was not sufficient to perform an acceptable stunt pattern, because stabilizing surfaces were smaller than those of conventional design to permit location of the bellcrank within the rear wing, leaving CG in approximately the same position. Larger control surfaces would have set CG more forward and would consequently have caused a more forward bellcrank position, resulting in undesirable external mounting arrangement.

Two courses of action could solve this problem. First, the moment arm between the supporting surfaces could be smaller and the size of the forward stabilizing surface could be larger in proportion to the shorter moment arm to obtain balance.

A better solution would be to incorporate movable control surfaces in the rear wing in conjunction with the control surfaces in the forward stabilizing wing. An O & R .23-powered profile canard showed possibilities for team racing and speed. Speeds compared favorably with any similar design we had done along conventional lines. For both of these categories, sufficient control response can be obtained by using control surfaces in the forward stabilizing wing only.

Our reason for trying the asymmetrical design was the desire to develop a different type of configuration suitable for speed. Only a few years ago many model builders were making models known as sidewinders. Briefly, these models featured one wing and stab panel mounted on opposite sides of the thrust line, with the engine generally mounted in horizontal fashion opposite the one wing panel.

These jobs were not stable enough despite the fact that they were flown controlline. The lower drag arrangement was more than offset by generally poor stability. It was essential that a reasonable balance between the lift and drag forces on each side of the thrust line be achieved. The engine nacelle was located outboard on the one wing panel and the tail boom on what originally could have been the wing root but was now a wing-tip.

The arrangement proved stable and general flight performance was good despite emphasis on simplicity. A new asymmetrical design incorporates a horizontally mounted engine with the cylinder head enclosed in a thickened, built-up wing on the side on which the boom is fastened. By using a built-up section throughout, a higher lift/drag ratio, as well as a more desirable balance of forces about the thrust line, was attained.

From our own experience we feel that an asymmetrical could be employed satisfactorily in other controlline categories, but unless speed is the objective it is unlikely that any particular advantage would be achieved.

The team racer is perhaps the least unusual of the designs, but because it was our first effort to employ a laminar flow airfoil section on a controlline model, it is worth discussing. Performance was very good and handling characteristics excellent. Speeds obtained with the Torpedo ranged anywhere from 100 to 105 mph. To us, these speeds indicated that higher speeds would be possible if more extensive use were made of laminar flow airfoil sections. It also left us with the impression that whatever changes were made to a design, speed progress would be slow because a very high percentage of power was being absorbed by the controlline system.

With rubber powered models the emphasis is primarily on the Wakefield class. Over the past few years we have tried to evolve new configurations or individual features which would push our flight averages beyond the five minute mark. Part of our emphasis is on the development of a successful push-pull arrangement in both conventional and canard type configurations. With the conventional type, we have had better than a hundred flights during which we tried many different tail surface proportions, turbulator strips in various positions and also different size props. The results were both good and bad, but thanks to the ruggedness of the model, we were able to fly it long enough to reach some definite conclusions which will help to exploit this type of configuration to better advantage in the future.

Because of the long nose moment arm, it

was essential to increase the stab area beyond the 32 per cent that we originally used. It was not until we were using close to 40 per cent of the wing area in the stab that the longitudinal stability problem was reduced sufficiently to get stable flights with a fair degree of consistency.

Why do we persist despite such difficulty? If you have better than a two-and-a-half-minute motor run and are capable of getting the model 400 to 500 ft. in the air, it seems to us quite foolish to abandon a potentially successful design merely because the stability problem is tough.

Since the stability problem was resolved pretty well, we are contemplating another design along similar lines, but with the following modifications. Instead of the 301-G airfoil, we will use a wing section with less severe pitching tendencies, such as the NACA M-12, and the stab section will incorporate the NACA .0009 symmetrical section in place of the Clark Y. The rear propeller diameter will be reduced to 19 in. with a pitch/diameter ratio of 2.0 and the propeller diameter will be increased to 22 in. with a pitch/diameter ratio of 1.6.

The canard push-pull was a hurry-up job utilizing surface units and props from discarded models. The fact that little forethought was given to this design showed through in flight testing. Contrary to most designs thrown together, it did not fly out of sight nor did we even get one flight which could be called satisfactory.

Our problem was over-all instability, caused primarily by the model's hybrid development. To begin with, the model wandered badly. We plan to extend the fuselage aft of the rear wing and to increase the effective rudder area with the addition of a third rudder at the rear of the fuselage.

Extending the length of the fuselage behind the wing would also have the desirable effect of producing a more rearward location of the CG. The model was very difficult to trim longitudinally and clay was added at the fuselage rear.

Hand-launched and towline gliders are the best means of tackling some new design configuration because of the minimum time and expense involved, the absence of torque and the lower flying speeds. The towline-gas combination originally started out to be just an all-balsa towline design. However, during the process of evolution, it was decided to make it a gas model as well. Performance was good, and as a towline it compared favorably with contest designs of like size and weight. Powered with an .049 Cub, it proved easy to adjust. With an .074 Cub, flight times improved, but adjusting the model was a little trickier because of higher speed.

The most notable difference in a proposed larger design will be the built-up structure. In locating the engine the thrust line will be lowered in relation to the rest of the model as much as possible and the dihedral increased slightly. The latter feature will minimize the problem of adjusting.

A canard towline, built several years ago, is still in flying shape. The model has been altered a number of times by varying the size of the planform areas and utilizing different combinations of airfoil sections. Performance was good, but could have been much better if the directional stability were improved. Rudders were added to the under-surface of the wing, but unfortunately their close proximity to the CG produced little added effectiveness. On the basis of the success of hand-launched canards with rudders behind the wing, it was decided to extend the fuselage and rudder several inches more behind the wing. Canard towliners are absolutely steady on the towline, even under adverse weather conditions.

Many other categories of model building and designing are ripe for exploitation by the modeler who is striving for originality.

END

The RC Engine

(*Continued from page 32*)

and the reader is therefore recommended, for detailed information, to the earlier article covering that type, and in these paragraphs we will accordingly concentrate on the problem which is closest to the hearts of most RC fans: two speed control.

Since, by now, the system of providing two spraybar units in the same intake, and running one at the optimum setting and the other rich in order to drown the engine into slow running, is familiar to the majority, it seems a good idea to review its disadvantages and consider the practicability of the many other systems. First of all, there is a prodigious amount of plumbing involved which is mainly concerned with conveying and controlling the meager little whisper of suction produced by the average spraybar, and the slightest leak in the connections and the clapper valves of the control unit therefore has a very pronounced effect on engine behavior.

Secondly, in order to shorten the tubes, the control unit must be located near the engine, which introduces design problems regarding rubber location for driving the control unit. It usually works out that the ideal position would entail the rubber's passing through the receiver. Finally, to the man who likes his engine clean and crisp, the idea of smothering the thing into slow inefficient combustion with a cataract of expensive fuel and having to remove the resulting goo from his paint job seems something less than ideal. What, then, are the advantages? It is cheap and, on the face of it, simple and reliable, until you delve into it in terms of over-all dollars, cents and net returns.

The alternatives? We cannot use the common throttle butterfly device because its effect is to slow down the air velocity over the jet with the results that mixture strength becomes too lean and the mechanism cannot be easily adapted to most model engines. Where it can, the addition of a second butterfly in the form of a choke, and synchronized perfectly with the throttle, will offset the lost air velocity, but then the whole thing becomes critical and delicate.

A successful solution to the mechanical problems of this system has been evolved by the makers of the English Mills Diesel and it takes the form of a barrel type throttle (see Fig. 1) which gives progressive control over a wide range of speeds, but to take full advantage of its capabilities, a fairly elaborate actuating mechanism is required, and its operation unfortunately entails a twisting movement of the fuel tubing.

Having shot everyone else's idea down in flames, we have incurred an obligation to make something better, and though the following system is a little tricky to make, it does obviate all the disadvantages of the other systems, and is extremely reliable and positive in operation, giving correct mixture strength at all times and a delayed engine shut-off, as well as high and low speeds. Above all, it gives immediate speed change with no hesitation for the glow plug to cool down or heat up, and can therefore be "blipped" like a two-speed spark ignition engine. When fitted to a Diesel it does not produce the intermittent bursts common to rich mixture control, but allows smooth running at either speed.

A glance at Fig. 2 will indicate the general design. In principle there are two carburetors, one having an intake of normal diameter and the other a very much smaller diameter. In all other respects they are identical, and both needles are set to give optimum performance. A simple two-way valve connects one or other of the two carbs to the engine intake by a rotational movement of 90°, the small carb giving low speed and the large one high speed. A mid-way position of the valve throttles both carburetors and reduces air velocity over the jet so that the mixture strength becomes too weak to support combustion and the engine stops. However, since a certain amount of fuel is getting to the engine, which decreases progressively as the engine slows down, the cessation of operation is gradual, taking about three seconds.

The operating mechanism is any standard two pawl escapement which will give a half position with signal ON. It is connected to the valve by the usual cranked extension of the escapement spindle as normally employed for rudder operation. In escapement terminology, the two neutral or signal OFF positions are the equivalent of HIGH and LOW speeds, and the LEFT and RIGHT or signal ON positions will both stop the engine within about three seconds.

This escapement can be hooked into the flight control system by arranging for contacts to close at one of the flight escapement's neutral positions, which will operate the motor escapement through an electrical delay such as a large capacity parallel connected condenser. When motor control is not required, the particular neutral position can be skipped over. Holding the position will therefore stop the engine; holding briefly will change speed; skipping will have no effect. The radio men will undoubtedly have better ideas for the electrical circuit, and discussion of them is best left to those with specialized knowledge. However, we can heartily recommend the set-up from the motor viewpoint.

Since we are not dealing with a motor of any specific displacement or design, it is not possible to give working dimensions. However, the unit evolved by the writer was used on a Forster front rotary .29, and the large intake was 9/32 in. dia. and the small, 3/16 dia., using a 1/8 in. dia. spraybar in both

cases. The illustration is roughly to a scale based on these dimensions and will therefore provide all necessary information. The valve plug diameter should be 50 per cent larger than the large intake diameter, and the low speed intake drilled initially on the small side as it can always be enlarged later to obtain the desired low speed performance. The high speed intake should be drilled to the same diameter as the original stock intake, provided the same diameter spraybar is used.

Construction of the unit will be greatly simplified if a gas line T fitting as used on automobiles is used as a basis for the body. There are several standard sizes and pestering the local parts dealers should produce a suitable size. Failing this, a tedious four jaw chuck lathe job is necessary, and either way, a lathe is desirable for a first class unit. If possible, dural should be used throughout, in the interests of light weight.

The only things that need watching are that the bores of the two intakes are concentric, and that the revolving plug is a free but airtight fit in the body. The correct diametric clearance between valve plug and body is .0004 in., and it is best to ream the hole to a standard size and then turn the plug to the reamer dimension less .00025 in. or as close as you can manage, using kerosine as a lubricant. Then insert the plug, again using kerosine, and worry it until it revolves fairly easily. Cleaning and oiling should then result in a completely free but airtight fit.

Although a radiused contour is shown for the slot in the plug in order to promote smooth gas flow, a flat bottomed slot will work almost as well and is much easier to file. The slot should be cut down to the center line of the plug at first, and if this results in abrupt stopping of the engine in the stop position, it should be filed progressively deeper until the correct delay is achieved. The deeper it goes, the more power available in the high position, as a shallow slot will restrict the high speed intake.

As shown in the illustration, the operating arm is integral with the plug, and begins life as a large diameter flange which is subsequently filed to the desired shape, and serves as end location for the plug. End location in the other direction is provided by a washer and small cotter pin, although other means may be used as preferred as long as end play is limited and friction and leakage kept to a minimum.

On most front rotary engines, the intake bore can stand reaming out 1/32 in. larger to receive the unit, and the original spraybar holes can be tapped for small set-screws to hold the unit in position. Nevertheless, the intake should not be increased in diameter for its entire length, as the rotary valve timing will be altered adversely, so always leave at least 1/16 in. at the bottom at the original size.

When installing the set-up in a model do not connect the two fuel lines but take them to separate pick-up tubes in the tank. Otherwise the spraybar in operation will simply suck air from the other jet instead of fuel from the tank.

An advantage of the general arrangement of this system is that the motor can be completely cowled with the needle controls extending through the top, and the intakes out of either side into fresh air where they will be convenient for priming and choking.

Finally, when the low speed intake diameter has been determined, you still have the opportunity of further reducing engine speed by running at a rich setting, which gets us back to where we started, but it won't be so horribly rich or expensive. END

Foreign Notes

(*Continued from page 37*)

evenings has appeared in England: indoor rubber-powered team racing. Rules include 20 in. maximum over-all length, wingspan not less than 60 per cent of length, maximum weight, including motor, 2 oz., cockpit and fixed landing gear. Models are tethered to a pylon and fly 30 laps against the clock, being rewound as necessary but with standardized winder gearing. Said to be a great aid to blood circulation.

Foreign Engine Owners Note

If you are puzzled by fuel recommendations in foreign engine leaflets, remember that kerosine is called "paraffin" in Britain, "paraffina" in Italy, "petroleum" in Germany, "petrole" in France. Ether is known as "etere" in Italy, "ather" in Germany. Castor oil is "olio di ricino" (Italian) "rizinusol" (German) and "huile de recin" (French). "Castrol R" and "Castrol M," sometimes recommended for British engines, are castor-base proprietary oils. Finally, to add to the confusion, gasoline is called "petrol" in Britain, "benzina" in Italy, "benzin" in Germany and "essence" in France.

No Dope the Inventor of This

How much thinner do you use? How much do you waste? In our experience, decanting thinners into dope is a ticklish business. With 90 per cent of bottles, jars, cans in which thinners is sold, 50 per cent of contents are wasted by (a) thinners spilling down side of container when trying to pour out carefully measured amount, or (b) splashing all over bench when trying to pour quickly to avoid (a). So we greeted with interest a German bottle of thinner which actually had a lip to it. With this we found spillage factor reduced to about five per cent. If you can't tolerate five per cent, use a syringe. END

Radio Control News

(*Continued from page 30*)

ceptible to picking up moisture from the air, keep lumps in a jar in a dry place.

3. A glass dish is preferred for etching and should be several inches larger than the piece of material to be etched. Caution—do not use a metal container. Porcelain coated pans may be used *provided* they have no chips or cracks.

4. Small fine paint brushes are used for painting on the etchant resist. Grumbacher No. 00000 brushes are excellent for this work and are obtainable at most art shops.

5. A resist paint is any type paint which will act as a resist to the etching action of the ferric chloride. Regular dope, plastic paints, shellac, nail polish, etc., may be used.

6. A suitable solvent, for the resist paint used, is used to remove the resist pattern after etching is completed. Dope thinner, turpentine, etc.

7. Scotch tape or plastic electrical tape is used to lay down a resist area. We shall use it to enable us to get straight lines.

After all of the above materials have been collected try experimenting by etching a small piece of the copper. First, place a small strip of scotch tape 1/16 in. wide on the test panel. At each end of this strip, paint on a small circle about 1/8 in. in diameter. This circle is known as a "land" and is the spot where a component lead may be fastened. Fig. E shows how this is to be laid out. After the pattern is finished, place the piece of material in the glass tray and pour in enough ferric chloride to cover it (ca. 1/4 in.). The etching action may be speeded up by rocking the tray back and forth until all the copper is removed. For the standard .0014 in. copper, the time will be about 12-15 minutes. Commercially, etching is done by the flat tray method, by spraying on the ferric chloride, by air agitation of the bath, and by splashing the solution against the plate in an enclosed tank.

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After etching, a No. 55 drill is used to drill a hole in the center of the land. This hole is for mounting the component as shown at Fig. F. When drilling the holes, lightly counterpunch before drilling and use a sharp drill. Take it easy so that the copper pattern is not torn off. The component is placed flush against the opposite side of this and the leads formed and soldered as shown in Fig. F. If desired, a 1/16 in. eyelet may be placed through the land, also shown in F. This is advisable if the component will be removed during experimenting. In either case, use a small Ungar iron for soldering. When an eyelet is used, be sure the solder covers the component lead, the eyelet, and the pattern. Do not depend on the eyelet's making good electrical connection to the pattern by itself.

When the technique of putting down a pattern is mastered and usable etched wiring patterns are obtained, the work of the RC designer can be developed as far as his ingenuity will take him. Let's see who'll be the first to send in plans for RC use that employ this new medium!

On a totally different subject, we'd like to talk about a recent idea we've had. In order to get more RC jobs in the air, for keeps, the beginner has to be able to get in some practical flying experience. After all, we have dual control cars for teaching people to drive, and dual instruction for large scale flying, so why not dual RC instruction?

Fig. A shows a very simple keying cable hook-up which will eliminate confusion for the beginner on his first few flights. The instructor handles one control box and the student takes the other box. The student can operate anytime until the instructor takes over, by pressing the normally closed buttons, thus relieving the student of all control. The instructor can then operate in the normal and can restore control to the student by releasing the "panic" button. We figure there ought to be one of these dual keying cables in every club or group where new RC fliers are encountered.

New Items

Having covered the latest in miniature and subminiature pots and variable capacitors, we'll discuss this month the different relays used in RC work.

The familiar Sigma 4F is shown in A. This generally is an 8,000 ohm relay with fully adjustable points and armature tension. Weighing 2-1/4 oz., it has a sensitivity, for general use, of approximately 25-30 milliwatts. Fig. B is perhaps one of the best relays made as far as ruggedness and sensitivity are concerned. This is another Sigma gem for model use known as the 5F and has an operating sensitivity of 5-10 milliwatts. Weighing 3-1/2 oz., this 10,000 ohm type is unsurpassed for conversion to a relay escapement. Also excellent regarding vibration.

Fig. C shows the 1/2 oz. Potter-Brumfield super midget 8,000 ohm relay, which has a sensitivity for our use of 80-100 milliwatts. The points definitely require an arc suppression network of a resistor and capacitor. This relay, too, is very good concerning vibration.

Figs. C_1 and C_2 show the same relay in steel and glass sealed containers, respectively. These plug into a standard seven-pin miniature socket. The 8,000 ohm versions have a sensitivity of 100-110 milliwatts and have very good shock and vibration characteristics. Weight is 1-1/4 oz. for the steel case and 1 oz. for the glass job.

As we go to press, P-B announces its new miniature high sensitivity relay in a case similar to that shown in Fig. C_1. Sensitivity is as low as 25 milliwatts and the contacts are more than capable of handling model RC requirements. Weight is only 1-1/16 oz.

Fig. D is the ED polarized relay, similar to the familiar Good Brothers relay. Weighing 1 oz., it has a sensitivity of approximately 30-40 milliwatts and its silver contacts are

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capable of handling several amperes. Coil resistance is about 4,500-5,000 ohms. Obtainable through Polks' Model Craft Hobbies.

Fig. E is another English ED Relay. This 5,000 ohm type weighs 3/4 oz. and has screw contact adjustments. Sensitivity is about 30-40 milliwatts and it makes a very good relay for two-tuber operation. Also available from Polks'.

In Fig. F we have the ECC 1/2 oz. 5,000 ohm relay. This is also of English manufacture, and may be purchased through Telasco Ltd., New York City. It has screw contact adjustments and a sensitivity of about 40 milliwatts.

The relay shown at G is the Neomatic, perhaps one of the most widely used of the sub-miniature types. Weighing 1/2 oz., it has a sensitivity of 75-100 milliwatts. Very resistant to vibration effects, it is an excellent "seconding" relay such as used for reed relays, etc.

H is a Terado relay as used in the Babcock equipment. The 8,000 ohm, 1-3/4 oz. version is in a steel case which plugs into a seven-pin miniature socket. Sensitivity is about 60 milliwatts.

Last but not least is the familiar Kurman 5,000 ohm relay as used in Aerotrol equipment. This is 1-1/2 oz. relay has a sensitivity of 28-40 milliwatts and when properly adjusted and the contact arms reinforced as we've mentioned in previous articles, gives excellent service. Fig. I.

As we predicted awhile back, comes Spring and strange things are happening in the RC line. International Hobbies of Albuquerque, N. M., presents the new ECE DX2 hard-tube receiver, which is not a "rehash" of standard circuits. This original circuit, using a 3S4, weighs but 1 oz. less relay. Operating on 45 to 67-1/2 volts, the current change averages from 1-1/2 to 2-1/2 ma and reliable operation is had even when the filament voltage drops to 1 volt and the plate voltage to 30 volts. Better check into this more by dropping a line to International Hobbies in the land of the Santa Fe trail.

It looks as though the deBolt Model Engineering Co. is going hog wild on RC planes and accessories. The latest is a really quality-built Multi-Servo. Picture shows a pre-production model of this new 1-1/2 oz. servo. According to available information, 5,000 operations can be obtained with only two pencells. This is a big step toward eradicating the bugaboo of excess weight when using motor servos. One beep gives right rudder, two beeps give left rudder and an automatic neutral is featured. Giving over 1/2 lb. of torque, these servos are available in four models, from rudder-only to elevator and engine control types.

Last month we mentioned the reed bank produced by RC Specialties of Eugene, Ore. Picture shows the 1 oz. three-reed unit. As you can see, this is a very compact and neat unit, ruggedly built. The five-reed unit weighs 1-1/2 oz.

Control Research has a new catalogue just out which features several new items, among which are snap connectors for the miniature RCA 45 volt batteries, and copper clad laminates for etched wiring use. END

Li'l Speed Merchant . . .

(Continued from page 22)

engine position. The Thermal Hopper mounting plate was filed down to the minimum cross-section of the crank case to decrease frontal area. The engine was then mounted to a 3/16 in. plywood firewall by using longer crank case bolts. Solder the engine mounting nuts to scrap tin or wire for easy removal of the engine. Select a piece of 1-1/4 x 1 x 9 in. pine and 1-1/4 x 1/4 x 9 in. balsa. Tack-cement these two pieces together and then carve to the shape shown on the plans.

The pine portion is hollowed to a maximum of 1/8 in. and a minimum of 1/16 in. but the balsa portion is hollowed only where needed to fit over the controls and engine. A 1 in. diameter Froom spinner is used in the front. Now, cement the firewall into place with the engine bolted in position. Use Weldwood or similar rugged hot fuelproof cement for this job since the model will take a whale of a beating at this point. Then, for additional firewall anchorage, drill and glue 1/16 in. dowels into the firewall through the sides and bottom of the fuselage. A fillet of cement, with some balsa dust mixed in, is then applied to the rear firewall and fuselage junctions. The bellcrank is cut and drilled from 1/32 in. aluminum and bolted to a piece of 3/16 in. sq. pine. This assembly is then cemented to the side of the fuselage nearest to the center of the circle.

The .040 in. dia. wire pushrod is housed in a 3/32 in. O. D. brass tube at the tank position to keep the pushrod from binding with the pen bladder tank. This tube is attached to fuselage with Weldwood cement. The cowl fairing is carved and hollowed from scrap balsa wood. If your engine has 360° exhaust porting, install a metal exhaust shield from scrap shim stock and attach to the cowl fairing with a couple of straight pins or a small wood screw soldered into position. The use of a pen bladder tank is a natural with a Thermal Hopper engine. Space Bug engines may be converted by grinding away the tank or replacement with a Thermal Hopper backplate. On engines using spray bar type needle valves check to make sure that the particular needle valve will hold back the fuel when a pen bladder is filled up: many spray bar type needle valves will not. You may attach the pen bladder direct to the engine and open up the fuselage for each filling or you may use the method shown on the plans and refuel from the outside with a calibrated cattle syringe. The

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SUPER SAUCER: Soaring towline glider. April '52.

BEAVER: Controlline model for .19-.29's. Feb. '52.
ZENITH: Taibi Class A '51 Nats cabin job. Feb. '52.

HALF WILD GOOSE: Half A free flight. Dec. '51.
FIRECRACKER: Flying scale U-control. Dec. '51.

pen bladder used on this model is the same as used on the larger speed jobs except that a shortened bladder is used to keep up fuel pressure on the Half-A's smaller fuel supply.

The wing is cut and shaped from a piece of hard quarter grained balsa 9 x 2-1/2 x 1/8 in. with a 1/8 in. sq. pine leading edge. The wing line-guide is cut and drilled from tin can stock and fastened with two very small nuts and bolts. 1/16 in. plywood was used for the tail surfaces on the original model for strength but you may use hard quarter grained balsa for lightness if you desire. Use aircraft fabric or similar type cloth for the elevator hinges. A control horn is cut and drilled from tin can stock and fastened into place with thread and cement.

You will notice that the wing and forward half of the fuselage are removable. This removable portion is held in place with a bicycle spoke and keyed in place with small balsa or pine scraps. Now, cement the tail and rear portion of the fuselage into place. Before installing the wing, find the center of gravity with the engine and spinner in place. Cement the wing into position now with the C.G. on the leading edge or slightly forward of it. Actually, the C.G. will move slightly rearward of this point after a finish has been applied and the engine is fueled up. A 1/32 in. dural skid is held in place with very small wood screws. Use 1/20 in. stranded cable for lead outs. Attach the lead outs to .006 in. steel lines with the smallest fish snaps that you can secure. You will notice that a small lead weight was used in the outboard wing of the original model. This is not completely necessary and is optional on your part; however, some of us fellows now always weight down the outboard tip to help keep speed jobs from rolling toward the center of the circle when something goes wrong; not a sure cure, of course, but many times it helps. Most fellows may have their own pet type of finish. For lightness this model may merely be brushed with clear hot fuelproof sealer; for a little more weight but a fancier paint job, cover with paper or silk and then colored paint. The original model was covered with a 17¢ silk handkerchief and then painted with colored Sta using red sable artist brushes. A good quality camel hair brush will do if it is a good one but a stiff shedding brush will mutilate any paint job. My model was colored bright yellow with black trim. The wing stripes were painted red, white and blue.

We use a hand lauch for Half-A speed jobs. Launch with the nose level and downwind—*downwind* by all means. If the model is slippery from excess fuel, use the two handed method with one hand on the fuselage and one on the wing. This eliminates the "slurp" type launch which simulates a wet bar of soap jumping out of your hand!

A 5/6 pitch drop is a good one to begin with and then decrease blade area and increase pitch as you become accustomed to your particular model. A prop of 4-1/2 in. diameter and 8 in. pitch worked pretty well on the original. END

Smartie . . .

(*Continued from page 12*)

used) is mounted in side winder fashion, regular engine mounts being used with 1/16 in. ply over to strengthen fuselage and make a solid mounting. Mount fuel tank on side of fuselage.

The wing struts are built with a center of 16 in. ply. Cut slots as shown on plans and fasten to inside of second from last outboard rib at top and next to last outboard rib at bottom.

The easiest way to assemble wings is to cement bottom wing firmly in position, let dry. Cement struts to bottom wing, then place top wing in position and check for alinement. The wings were covered *before* assembly. Small cut-outs were made in covering at the position for struts and covering cemented back in place after assembly.

The landing gear is mounted similarly to any profile model. Insert wire through hole in fuselage and bind securely at bottom. A small piece of wire formed U-fashion and driven into the fuselage across the wire binding will help keep the gear in place.

The tail section is built from 3/16 in. sheet. Use your favorite hinge system. The tail skid is formed from sheet aluminum in two pieces. Cut one small piece to use for a spring. Drill both for 1/16 in. dia. wood screws and fasten to rear of fuselage. Good results were obtained from this method.

To save weight, thin Hely-Arc wheels may be used.

Fly on '52 lines. The bipe will perform the usual stunt pattern, behaving especially well when flown almost straight overhead. It is not tricky, combining the docile qualities of a trainer with the maneuverability of a good stunt machine. END

Flash News

(*Continued from page 38*)

America's first jet transport is moving rapidly toward its scheduled completion date this month, its taxi tests in August and its first flight test Sept. 1, 1954. The big Boeing 707 four-jet transport has been revealed as 95-ton swept-wing giant capable of carrying from 80 to 150 passengers, depending on the range and payload requirements of the individual customers (the more passengers the less range). It has a wing span of 130 ft. and is 128 ft. long. The four Pratt & Whitney J57 turbojet engines are slung in individual nacelles below the wing. The Boeing 707 is expected to cruise at 550 mph at 35,000 ft. with a 25,000-lb. payload. Boeing has not yet announced any airline sales of the sleek speedster and, significantly, the prototype fea-

ADVT. INDEX, JUNE, 1954

tures two huge cargo loading doors and no passenger windows, the kind of configuration you could expect in an Air Force cargo and jet tanker transport!

North American chiet engineer Raymond Rice is developing a theory that a fighter can be deadly in combat by scoring near-misses! The first public demonstration of the supersonic North American YF-100 *Super Sabre* last fall resulted in shattered glass and cracked timbers in the Administration Building at Palmdale, Calif. Rice and other NAA engineers have been studying this phenomenon ever since and have completed calculations on the destructive force of shock waves. Their study shows that the bow wave from an F-100 in level flight at supersonic speed creates a pressure differential of 12 lb./sq. ft. at a distance of 1,750 ft. and 50 lb./sq. in at a distance of 250 ft. This pressure could easily tear apart a Piper Cub and could rip asunder light structures on the ground. Thus, in a low-level pass along an enemy residential area, the homes could be torn apart and the flying glass prove deadly. With shock waves as a weapon, the F-100 would need carry no armament and its weight placed in fuel to increase its range. Meanwhile, F-100 pilots have been forbidden to fly at supersonic speed: within a mile of other aircraft, at less than 10,000 ft. altitude at any time, and within 15 miles of an inhabited area.

CONTEST CALENDAR

MAY

2—*Marysville, Calif.*: Class AA Fifth Annual Marysville Exchange Free Flight Contest for FFG, PL, TLG and OR. Lyman C. Armstrong, C.D., 229 B St., Yuba City, Calif.

15—*Brooklyn, N. Y.*: Class AAA Ninth Annual Mirror Model Flying Fair for CL, CLS, FFG, PL, CC, beauty, RC, combat, TR and Navy carrier. Entry is restricted to first 1,000 contestants. Art Hasselbach, C.D., c/o Mirror Model Flying Fair, 235 E. 45th St., New York 17, N. Y.

16—*Milwaukee, Wis.*: Class AA Milwaukee Flying Electrons' Radio Control Meet. Victor Weissbrodt, 2100 E. Webster Pl., Milwaukee, Wis.

16—*Murfreesboro, Tenn.*: Contact Lomas R. Moffett, 127 S. Church St., Murfreesboro, Tenn. for information. Pending.

16—*Rock Island, Ill.*: Rock Island Beauty Contest. Jack Stucker, C.D., 4105 14th Ave., Rock Island, Ill. Pending.

16—*Santa Ynez, Calif.*: Class AA Second Annual Omnimeet for FFG, TLG and OR. Stanley D. Hill, C.D., 1020 State St., Santa Barbara, Calif.

23—*Hartford, Conn.*: Class AA Greater Hartford Team Race. Richard Matava, C.D., 358 Prospect Ave., Hartford, Conn.

29 & 30—*Los Angeles, Calif.*: Class AAA California Model Airplane Championships for CL, CLS, CLFS, combat, Navy carrier, TR, FFG, OR, TLG, OHLG, IHLG, IR and RC. R. E. Gass, C.D., 2864 Rutgers Ave., Long Beach 15, Calif.

30—*Fresno, Calif.*: Fresno Gas Model Club Record Trials for FFG. Jim Scheidt, C.D., 2225 Brown, Fresno, Calif.

30—*Tulsa, Okla.*: Record Trials for OR, OHLG, TLG, FFG, ROW classes and CL. Willard H. Kehr, C.D., 4940 N. Johnstown, Tulsa, Okla.

30—*Brooklyn, N. Y.*: Sky-Scrapers' Annual Meet. Contact Joseph Scuto, 7023 11th Ave., Brooklyn 28, N. Y. for information. Pending.

30—*Galesburg, Ill.*: Galesburg Team Race. Ken Freese, C.D., 90 Olive St., Galesburg, Ill. Pending.

30 & 31—*Scottsbluff, Neb.*: Class AA 4th Annual Scottsbluff Model Contest for CL, CLS, CLFS, combat, FFG and RC. C. H. Adkins, C.D., 2418 Ave. E, Scottsbluff, Neb.

JUNE

5—*Bronx, N. Y.*: Pending:

5 & 6—*Goodland, Kan.*: Northwest Kansas Meet for FFG, CLFS, CLS, CL, combat and RC. Kenneth Armstrong, C.D., Goodland, Kan.

6—*Kansas City, Mo.*: Contact Peter W. Asjes, 5313 Ralston, R. 3, Kansas City, Mo., for information. Pending.

6—*Wilmington, Del.*: Class AA Fourth Annual Exchange Club Meet. W. Lewis Knowles, Jr., C.D., 515 Shipley St., Wilmington, Del. Pending.

6—*Medina, Ohio*: Class AA First Annual Medina Glo Bug Invitational Meet for CL, combat, CLS, Navy carrier, and scale. Alex Morton, Jr., C.D., 716 Oak St., Medina, Ohio.

6—*Monticello, Ind.*: First Annual Monticello Prop Busters' Meet for FFG, CLS and combat. Charles Harlan, C.D., RR 5, Monticello, Ind. Pending.

11 & 12—*Alexandria, Minn.*: Contact Clyde J. Newstrom, 119 Fifth Ave., W., Alexandria, Minn., for information. Pending.

13—*San Diego, Calif.*: Class AA San Diego Aeroneers' PAA Load Contest. George G. Wagner, Sr., C.D., 6851 Newbold Court. San Diego 11, Calif.

13—*Millville, N. J.*: Garden State Aeronauts' Meet. Andrew Canino, C.D., 116 Quince St., Vineland, N. J. Pending.

13—*Erie, Pa.*: Class AA First Annual M.A.C.E. Meet for FFG, CL, TLG, combat and CLS. H. N. Parker, Jr., C.D., 2133 Fairmont Pkwy., Erie, Pa.

13—*Sacramento, Calif.*: Class AA Northern California Free Flight Council Meet for FFG, OR and TLG. John Lenderman, C.D., P.O. Box 216, French Camp, Calif.

19 & 20—*Perth Amboy, N. Y.*: Class AA First Pylon Controlled Closed Course Contest. Robert Peru and Martin Maciag, C.D.'s., RD 4, Rahway, N. J.

20—*Hagerstown, Md.*: Class AA Fourth Annual Hagerstown Model Flying Circus for CL, CLS, TR, combat, 1/2A, FFG, TLG, beauty, OR, OHLG and RC. John Young, C.D., Box 691, Hagerstown, Md.

20—*Cleveland, Ohio*: Class AA Third Annual 1/2A Free Flight Flying Scale Meet. John W. Grega, C.D., 355 Grand Blvd., Bedford, Ohio.

26 & 27—*Detroit, Mich.*: Class AAA Michigan State Exchange Model Plane Meet for CL, CLS, CLFS, OR and FFG. Entry is restricted to residents of Michigan. F. P. Sposite, C.D., 9900 E. Jefferson, Detroit 14, Mich.

27—*Fresno, Calif.*: Fresno Gas Model Club Record Trials for FFG. Jim Scheidt, C.D., 2225 Brown, Fresno, Calif.

27—*Baltimore, Md.*: Class AAA Second Annual Friendship U-Control Olympics for CLS, CL, CLFS, TR, combat, Navy carrier, and beauty. F. G. Stroh, C.D., RFD 6, Pasadena, Md.

27—*Long Island, N. Y.*: Class AAA Seventh Annual Long Island Championships for FFG, PL, and Jetex. Edwin W. Howe, C.D., 168-01 144 Ave., Jamaica 34, N. Y.

27—*Rock Island, Ill.*: Rock Island 25-Mile Derby. Jack Stucker, C.D., 4105 14th Ave., Rock Island, Ill. Pending.

JULY

27 - August 1—*Chicago, Ill.*: Class AAAA 1954 National Championship Model Airplane Contest. For information and entry blank send self-addressed, stamped envelope to AMA Headquarters, 1025 Connecticut Ave., N.W., Washington 6, D. C.

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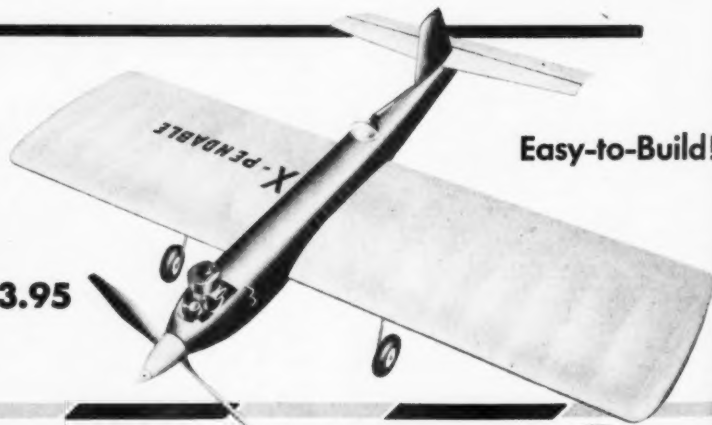

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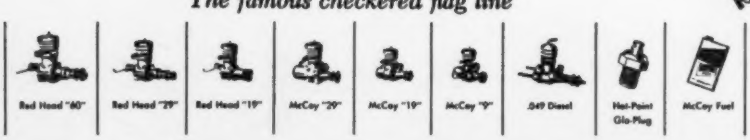

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